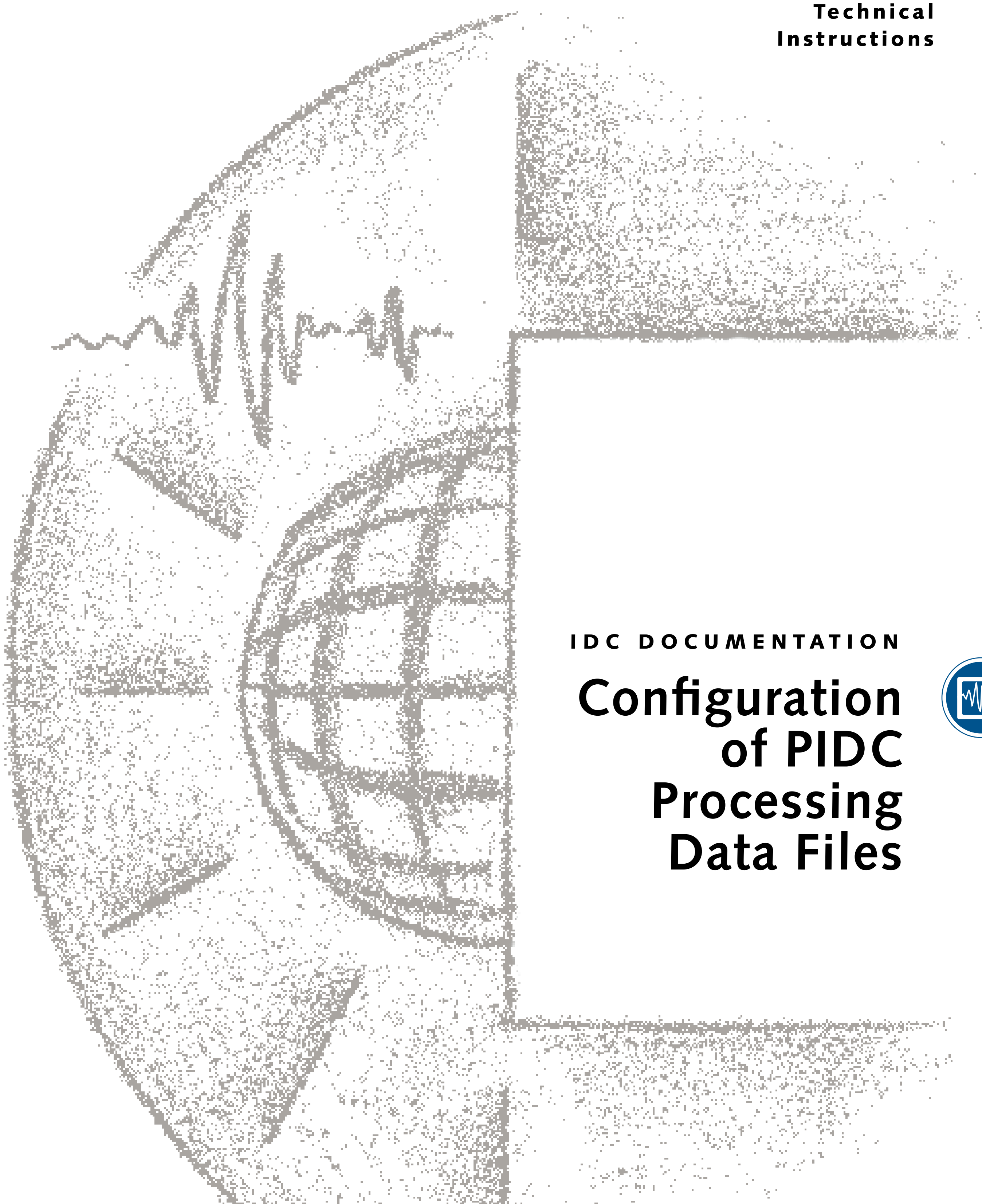
Technical
Instructions



IDC DOCUMENTATION

Configuration of PIDC Processing Data Files

Revision 0.1

Notice

This document was published October 2001 by the Monitoring Systems Operation of Science Applications International Corporation (SAIC) as part of the International Data Centre (IDC) Documentation. It was first published in March 1999 and was republished electronically as Revision 0.1 in October 2001 to include minor changes (see the following Change Page). IDC documents that have been changed substantially are indicated by a whole revision number (for example, Revision 1).

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Trademarks

Ordering Information

The ordering number for this document is SAIC-01/3050.

This document is cited within other IDC documents as [IDC6.2.4Rev0.1].

Change Page

This document is Revision 0.1 of the Configuration of PIDC Processing Data Files. The following changes have been made for this publication:

Page	Change
Notice	Revised page to indicate the document contains minor revisions.
iv	Removed reference to [IDC6.4Rev.1].
iv	Added applications to list of man pages under "Related Information."
All Chapters	Updated book to include chapter numbers.
2	1st paragraph. Changed "defined as" to "assigned."
2	1st paragraph. Added "sometimes" to "...information is sometimes not available"
3	1st paragraph. Removed ", and the version of the software"
3	2nd paragraph. Added ", oceans, and atmosphere."
3	Figure 1. Added "/bayes.tbl" to file structure. Added "Station-specific" to structure.
4	Figure 2. Added files to file structure. Added "Station-specific" to title.
5	Figure 3. Added files to file structure. Added "Station-specific" to title.
8	Figure 5. Added process #9.
9	Table 1. Changed *{sta}*`-qc.par` to be *{sta*}`-infra-qc.par`. Also added the following configuration data files: *{sta}*`-precond.par`, *{sta}*`-hydro.par`, *{sta}*`-infra-amp.par`, `bayes.tbl`, `ims.defs`, and `idc_mdf.defs`.
11	Changed *{sta}*`-qc.par` to *{sta}*`-infra-qc.par` and revised definition.
12	Changed channel codes to be upper-case, three-letter codes.
12	Changed two-letter codes "bz" to "BHZ" and "sz" to "SHZ."
13	Changed two-letter code "sd" to "BDF."
14	Added paragraph describing how depth-phase SNR beam recipes must be defined for seismic stations to reflect a specific filter set.
23	Added section "Preconditioning Filter: {sta}-precond.par."
24	Added parameters to second paragraph. Changed some values in the CDF.
25	Added section "Hydro_Detection Filter: {sta}_hydro.par."

Page	Change
26	Changed baseline CDF to include upper-case, three-letter codes.
27	Added description of fk recipes.
27	Removed CDF baseline and added explanation.
28	Added section "Infrasonic Amplitude Calculation: {sta}_infra_amp.par."
30	Added section "Bayes Probabilities: bayes.tbl."
32	Added section "Velocity Model: ims.defs."
32	Added section "Magnitude Definition: idc_mdf.defs."
35	Added section "Time Interval by Network: tin_{GRP}.par"
39	Modified Table 7.
41	Changed components to be upper-case, three-letter codes.
49	Modified Table 10.
53	Modified Table 11.
55	Added section "DFX - Event Characterization: {sta}-beam.par."
56	Added section "Event Screening: evsc_par."
60	Modified Table 12.
64	Modified Table 13.
72	Modified Table 14.
75	Added new section: "CDFs Needed to Add or Modify Channel Names," including Table 15, which lists CDFs that contain references to channel names.

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About this Document

This chapter describes the organization and content of the document and includes the following topics:

- Purpose
- Scope
- Audience
- Related Information
- Using this Document

About this Document

PURPOSE

This document is a guide for incorporating new stations into the International Data Centre (IDC) processing application software. It provides answers to the following basic questions regarding the IDC software:

- What files hold configuration parameters, and where are those files located in the filesystem?
- How can new seismic, hydroacoustic, and infrasonic stations be added so that they are treated properly in the IDC processing?
- How can parameters and other information about stations that are already included in IDC processing be changed?
- How can the system performance be changed through these parameters?

IDC processing application software is configured and operated via thousands of parameters spread over a thousand or more files. This document describes the topological arrangement of these files, relates the files to the pertinent application, and describes a few of the parameter classes. This document further describes the data and station-specific parameters needed to reconfigure the IDC processing software for data from new seismic, hydroacoustic, and infrasonic stations. Some of these parameters are static, that is they are set once at the time a new station is introduced into IDC operation or if the station configuration changes. Other parameters are set to baseline or initial values when a new station is added and are later changed based on operational experience, results of new research, or other factors. The baseline parameters described in this document include all parameters necessary for stations that were installed in the Prototype IDC (PIDC) processing.

Using this baseline, a processing manager or operator can incorporate new stations, modify existing stations, or modify system configuration data files (CDFs) to tune the system.

The following general changes were made for this revision to cover configuration and software changes:

1. The file structures of seismic, hydroacoustic, and infrasonic configuration data files were updated (see Figures 1, 2, and 3 in Chapter 1).
2. Chapters and tables were updated to include the following CDFs: `cds.par`, `evsc.par`, `hae_net`*{GRP}*`.par`, *{sta}*`_beam.par`, *{sta}*`-hydro.par`, *{sta}*`_infra_amp.par`, *{sta}*`_infra_qc.par`, *{sta}*`-precond.par`, `tin_`*{GRP)*`.par`
3. The CDF *{sta}*`-qc.par` was changed to *{sta}*`_infra_qc.par`.
4. Table 15 was added. This table sorts, by processing application software, the CDFs that contain references to channel names.

SCOPE

This document describes the architectural and detailed configuration of the station-specific parameters for automatic and interactive data processing including their definition, functionality, baseline values, and in most cases, the scientific references from which they are derived.

AUDIENCE

This document is directed primarily at the operators of the IDC automatic and interactive processing system. The document is also a resource for the reader who desires a better understanding of the scientific rationale behind the selection of key operational data and processing parameters.

RELATED INFORMATION

For a complete discussion of the scientific basis, algorithms, and techniques of IDC processing, see [IDC5.2.1]. The following UNIX Manual Pages apply to configuring parameters for new stations:

- *DFX*
- *EvLoc*
- *GA*
- *StaPro*
- *WaveExpert*
- *XfkDisplay*
- *HAE*
- *GAcons*
- *GAassoc*
- *GAconflict*
- *evsc_drv*
- *tin_server*

See "References" on page 85 for a complete list of references that supplement this document.

USING THIS DOCUMENT

The technical instructions for IDC software are grouped within Category 6 of the overall documentation architecture.

This document is organized as follows:

- Overview

  This chapter presents the directory and file structures for seismic, hydroacoustic, and infrasonic configuration data files (CDFs) and an overall functional model of the system.

- Configuring Station Processing

  This chapter identifies the steps of the station processing function and describes the CDFs containing processing parameters used in this function.

- Configuring Network Processing

  This chapter identifies the steps of the network processing function and describes the CDFs containing processing parameters used in this function.

- Configuring Interactive Processing

  This chapter identifies the steps of the interactive processing function and describes the CDFs containing processing parameters used in this function.

- Configuring Post-analysis Processing

  This chapter identifies the steps of the post-analysis processing function and describes the CDFs containing processing parameters used in this function.

- Checklists for Configuring New Stations

  This chapter provides tables of the static and dynamic parameters needed to configure a new station in the processing. It also contains a checklist of all CDFs needed to add new stations to the processing systems. These tables and checklists include cross-references to the pages in this document that describe the parameters and CDFs.

- References

  This section lists all sources cited in this document.

- Glossary

  This section defines the terms, abbreviations, and acronyms used in this document.

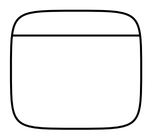
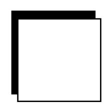
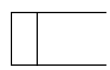
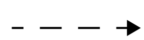
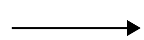
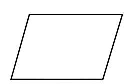
- Index

  This section lists topics and features provided in this document along with page numbers for reference.

Conventions

This document uses a variety of conventions, which are described in the following tables. Table I shows the conventions for data flow diagrams. Table II lists typographical conventions. Variables in filenames are represented by a bracket *{ }*. Typical variables are station and channel designators specified in the **affiliation**, **site**, and **sitechan** tables of the database. Table III explains certain technical terms that are not part of the standard Glossary, which is located at the end of this document.

TABLE I: DATA FLOW SYMBOLS

Description[1]	Symbol
process	
external source or sink of data	
data store	
control flow	
data flow	
product	

1. Most symbols in this table are based on Gane-Sarson conventions [Gan79].

TABLE II: TYPOGRAPHICAL CONVENTIONS

Element	Font	Example
database table	**bold**	**sitechan**
database table and attribute, when written in the dot notation		**prodtrack**.*status*
database attributes	*italics*	*status*
processes, software units, and libraries		*DFX*
user-defined arguments and variables used in CDFs or program command lines		*qc-interval-samples* *{sta}*`-beam.par`
titles of documents		*Subscription Subsystem*
beams		*cbtmp*
CDFs and directories	`courier`	*{sta}*`-beam.par`

TABLE III: TECHNICAL TERMS

Term	Description
configuration data file (CDF)	This ASCII file contains values for parameters of a program. These files are used to replace command line arguments. The files are formatted as a list of `[token = value]` strings.
software unit or computer software component	These terms define an element of a Computer Software Configuration Item (CSCI), including a major subdivision of a CSCI or any of its contained subunits.
static processing parameters	This term refers to parameters that are set once when a new station is added to the processing and changed only if the station configuration changes.
dynamic processing parameters	This term refers to the parameters that are set to baseline values when a new station is added to the processing and then changed or tuned based on operational experience or new research results.

Chapter 1: Overview

This chapter provides an overview of the directory and the CDF structures that contain the station- and data-specific parameters needed to control the processing application software. The functional model for station, network, and interactive processing is provided as a framework for presenting the CDFs and the parameters stored with them. The CDFs and parameters are described further in the next chapters.

Chapter 1: Overview

The IDC software is controlled by many parameters. Some of these parameters have default values that are embedded in the source code, but can be overridden during program execution. In some cases, the default values in the system have been changed based on operational experience and subsequent tuning at the PIDC. These adjusted parameters are referred to as baseline parameters and are used in the current configuration of the system to process the current set of International Monitoring System (IMS) stations. The values of both the default and baseline parameters can be overridden, if necessary, by defining the values of the specific parameter in a command line or in a CDF. If parameters are not the same as the default values, the parameters are defined in CDFs, which are stored in directories in the filesystem. Parameters that are data- or station-specific must be defined individually for each station before they can be added to the automatic or interactive processing systems. Generally, any and all parameters can be assigned a station-specific value. In practice, however, either station-specific information is sometimes not available or parameters are not station specific.

Changes are made to the system via parameters contained in CDFs. These files are contained in the system file structure and are grouped according to processing function and data types. Figures 1, 2, and 3 show the directory and file structures for seismic, hydroacoustic, and infrasonic data files, respectively. Files ending in the suffix ".par" are parameter files that follow the format and conventions of *libpar*; data files with names ending in other characters have formats specific to the software unit that uses these files. Figures 1, 2, and 3 show only CDFs that are station specific; they do not show data files that are applied to all stations, such as seismic travel times.

The high-level directory structure contains CDFs for processing. This structure is described in [Koh98b]. The root of the directory structure, `$config`, is a variable representing a specific path that depends on the site of the installation and the platform at that site. The `app_config` directory contains CDFs relating to configuration of processing application software. These latter CDFs generally do not require knowledge of earth characteristics.

The `app_config` directory is organized by components of the processing application software. The `earth_specs` directory contains CDFs that specify signal propagation characteristics in the earth, oceans, and atmosphere. The `station-specs` directory CDFs contain general station parameters that are used by more than one software component and are mostly mechanical.

```
$config
└─/app_config ──────────────────/earth_specs ─────────────/station_specs
   ├─/DFX                        ├─/MAG/tlsf/idc_tlsf.defs   └─/{sta}.par
   │  ├─/beam                    │  └─mdf/idc-mdf.defs
   │  │  ├─/{sta}-beam.par       ├─/SASC/sasc.{sta}
   │  │  ├─/detection/{sta}-beam.par ├─/STAPRO
   │  │  └─/originbeam/{sta}-beam.par │  ├─/ipnnwts.dir/{sta}.nn
   │  ├─/fk/{sta}-fk.par         │  ├─/ipnnwts.tbl
   │  ├─/polar/{sta}-polar.par   │  └─/bayes.tbl
   │  └─/smult/{sta}-smult.par   └─/TT/vmsf/ims.defs
   ├─/automatic
   │  ├─/GAcons/GAcons.par
   │  └─/WaveExpert/WaveExpert.par
   └─/interactive
      └─/XfkDisplay
         ├─/arrays/{sta}_fk.par
         ├─/recipes/{sta}.par
         └─/XfkDisplay.par
```

FIGURE 1. FILE STRUCTURE OF STATION-SPECIFIC SEISMIC CONFIGURATION DATA FILES

```
$config
└─/app_config ─────────────────── /earth_specs ─────────────── /station_specs
   ├─/DFX                            ├─/STAPRO                    └─/{sta}.par
   │  ├─/beam                        │  └─/hydro_{sta}.weights
   │  │  ├─/{sta}-beam.par           ├─/BLK_OSO
   │  │  ├─/detection/{sta}-beam.par │  └─/BLK.{sta}.T
   │  │  └─/hydro/{sta}-beam.par     └─/TT
   │  ├─/hydro                          └─/radial_2D
   │  │  └─/{sta}-hydro.par                └─/HYDRO_SEASON
   │  └─/precond                              ├─/AUTUMN
   │     └─/{sta}-precond.par                 │  └─/{sta}
   ├─/automatic                               ├─/SPRING
   │  ├─/GAcons/GAcons.par                    │  └─/{sta}
   │  ├─/HAE/hae-net{GRP}.par                 ├─/SUMMER
   │  └─/EVSC/evsc.par                        │  └─/{sta}
   └─/distributed                             └─/WINTER
      └─/tin/tin_{GRP}.par                       └─/{sta}
```

FIGURE 2. FILE STRUCTURE OF STATION-SPECIFIC HYDROACOUSTIC CONFIGURATION DATA FILES

```
$config
└─/app_config ─────────────────────── /earth_specs ────────── /station_specs
   ├─/DFX                               ├─/SASC/sasc.{sta}       └─/{sta}.par
   │  ├─/beam                           └─/TT
   │  │  ├─/{sta}-beam.par                 └─/radial_20
   │  │  └─/detection/{sta}-beam.par          └─/INFRA_SEASONAL
   │  ├─/fk/{sta}-fk.par                         ├─/AUTUMN
   │  └─/infra                                   │  └─/{sta}
   │     ├─/{sta}-infra.par                      ├─/SPRING
   │     ├─/qc                                   │  └─/{sta}
   │     │  └─/{sta}-infra_qc.par                ├─/SUMMER
   │     └─/amp                                  │  └─/{sta}
   │        └─/{sta}-infra_amp.par               └─/WINTER
   ├─/automatic/GAcons/GAcons.par                   └─/{sta}
   └─/interactive
      └─/XfkDisplay
         ├─/arrays/{sta}_fk.par
         ├─/recipes/{sta}.par
         └─/XfkDisplay.par
```

FIGURE 3. FILE STRUCTURE OF STATION-SPECIFIC INFRASONIC CONFIGURATION DATA FILES

Figure 4 shows the overall functional model for system processing of seismic, hydroacoustic, and infrasonic data. These system functions are performed by the processing application software, which is configured using the parameters stored in CDFs. The processing steps are described in the following chapters.

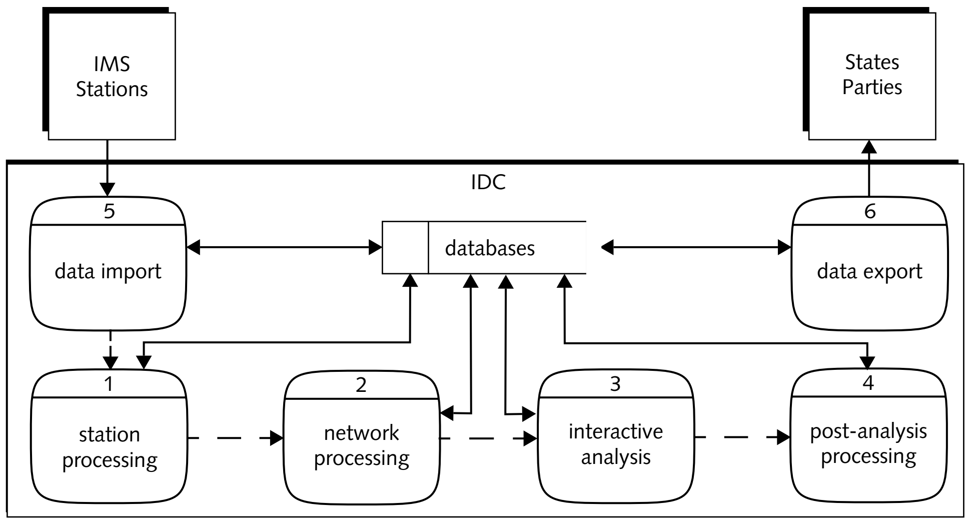


FIGURE 4. FUNCTIONAL MODEL FOR SYSTEM PROCESSING

The station-specific or static parameters that are set once to specify station name, number of channels, and so on, are provided in Table 12 on page 60. The data-dependent or dynamic parameters used to process the data are described in the following chapters according to the processing steps that they support. Table 13 on page 64 provides the current baseline dynamic processing parameters. Definitions of parameters are given in the UNIX manual pages for each software unit.

A checklist of all the CDFs needed to add data from new stations to the automatic and interactive processing systems is provided in Table 14 on page 72. Table 15 on page 75 sorts, by processing application software, the CDFs needed to add or modify channel names.

Chapter 2: Configuring Station Processing

This chapter describes the CDFs needed to configure the application software for the station processing of seismic, hydroacoustic, and infrasonic data. The software is used as a framework for organizing the parameters and CDFs that must be changed to add a new station, modify information about an existing station, or tune the processing. A process model first illustrates each step in the station processing function. A table then summarizes the CDFs used in each step. Descriptions of the parameters in each CDF follow the table.

Chapter 2: Configuring Station Processing

The overall functional model of the operational processing is shown in Figure 4 on page 6. Figure 5 shows the steps in the station processing function. The processing application software, which is configured using the parameters stored in the CDFs, executes the steps in this function. The processing application software *Detection and Feature Extraction (DFX)* performs steps 1–5, and *Station Processing (StaPro)* performs steps 6–8. *Hydroacoustic Azimuth Estimation* (HAE) and *tin_server* perform step 9.

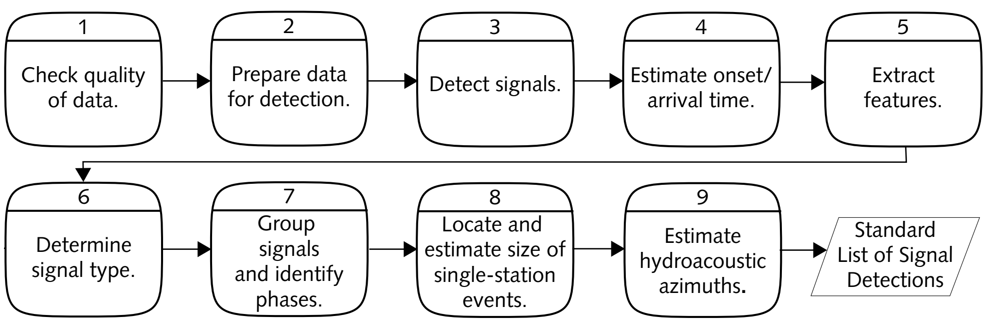


FIGURE 5. STATION PROCESSING

The CDFs used for station processing are grouped in Table 1 according to the processing steps illustrated in Figure 5. The first column in the table corresponds to the processing step number. Each CDF and the parameters associated with it is described in the following sections under the appropriate application software processing step, with the exception of *{sta}*`.par`, which applies to more than one processing step.

TABLE 1: STATION PROCESSING CONFIGURATION DATA FILES

Step	Application	CDF	Description	Data Type[1]	Ref. Page
	DFX, StaPro	*{sta}*`.par`	general station parameters needed for processing	SHI	10
1	*DFX*	*{sta}*`-infra-qc.par`	infrasonic data quality control processing	I	11
2	*DFX*	*{sta}*`-beam.par`	channel groups for beamforming or cross-correlation	SHI	12
		{sta}`-beam.par`	steering beams for signal detection	SHI	14
		{sta}`-precond.par`	FIR filter	H	23
3	*DFX*	*{sta}*`-infra.par`	parameters for infrasonic data processing	I	24
		{sta}`-hydro.par`	parameters for hydroacoustic data processing	H	25
		{sta}`-polar.par`	parameters for 3-C polarization analysis	S	25
		{sta}`-fk.par`	parameters for automated frequency-wavenumber (F-k) analysis	S	26
5	*DFX*	*{sta}*`-infra-amp.par`	nature of amplitude estimation	I	28
6	*StaPro*	`ipnnwts.tbl`	neural network weights of all 3-C seismic stations	S	28
		{sta}`.nn`	station-specific neural network (nn) weights used to compile nn weights for all 3-C stations	S	29
		`hydro_`*{sta}*`.weights`	set of neural network weights for phase identification	H	29
7	*StaPro*	`bayes.tbl`	Bayesian probabilities	S	30

TABLE 1: STATION PROCESSING CONFIGURATION DATA FILES (CONTINUED)

Step	Application	CDF	Description	Data Type[1]	Ref. Page
8	*StaPro*	`sasc.`*{sta}*	tables for Slowness-Azimuth Station Correction (SASC)	SI	30
		`idc_tlsf.defs`	magnitude estimation (VMSF, MDF)	S	31
		`ims.defs`	velocity model	S	32
		`idc_mdf.defs`	magnitude definition	S	32
9	*Hydroacoustic Azimuth Estimation (HAE)*	`hae-net`*{GRP}*`.par`	network-specific parameters for HAE calculation	H	33
	tin_server	`tin_`*{GRP}*`.par`	site-specific parameters for creating time intervals for HAE	H	35

1. S = seismic, H = hydroacoustic, I = infrasonic

DFX, STAPRO

General Station Parameters: {sta}.par

Directory: `$config/station_specs`

This CDF describes several static site-specific parameters that are used by multiple programs such as *DFX* and *StaPro*. The parameters defined in this CDF are mostly mechanical parameters, such as *NetType*, *StaType*, *tf-vert-chan*, *tf-3c-chans*, *WaveType*, *BandType1*, and *BandType3*, of each station.

Two parameters for phase identification at arrays are defined: *noise-fkqual-fstat* and *min-teleseismic-velocity.* The parameter *noise-fkqual-fstat* is a pair of thresholds that classifies an arrival as noise. Applying this parameter to arrays can reduce the number of disassociated phases that would be incorrectly associated by *Global Association* (*GA*) and later dissociated by analysts. This parameter can be derived from observations after a period of operation and is optional for a new array. The parameter *min-teleseismic-velocity* is a threshold that defines the apparent velocity boundary between teleseismic P and regional P phases. For a new array, the baseline parameter *min-teleseismic-velocity* is 9.4 km/sec.

DFX

Quality Control Parameters: {sta}-infra-qc.par

Directory: `$config/app_config/DFX/qc`

This CDF defines sets of parameters for infrasonic data quality control processing in *DFX* [IDC5.2.1]. Although they can be set to different values for different infrasonic arrays, all parameters except *qc-interval-samples* and *qc-apply-extended* are set to the same values for all infrasonic arrays in the current system. The baseline value for *qc-interval-samples* is the product of sample rate and coherent integration time (see Table 13 on page 64) adjusted to the closest integer; thus, the value is `640` for a nominal sample rate of 20 per second and a coherent integration time of 32 seconds. The baseline value for *qc-apply-extended* is `1`; where the individual sensor stations at a given infrasonic array exhibit dramatically different DC offset, the value of this parameter should be set to `0`. The following baseline CDF is used in infrasonic data quality control:

```
# @(#)   {sta}-qc.par     1.1    {dd/mm/yy}

qc-max-mask-fraction=0.2
qc-fix=0
qc-interval-overlap-fraction=0.5
qc-apply-extended=1

# Array-size and sampling rate dependent parameters, tuning may be necessary later on.
qc-interval-samples=640
```

Channel Grouping: {sta}-beam.par

Directory: `$config/app_config/DFX/beam`

This CDF defines channel groups for beamforming seismic and hydroacoustic data or cross-correlating infrasonic data in *DFX*. For three-component (3-C) and one-component (1-C) stations, channel grouping is straightforward except for setting the correct channel type (bz, BHZ, bhz, ez, EHZ, ehz, sz, SHZ, shz, and so on). For arrays, however, channel groups, also called subarray configurations, are dependent on the geometry of array, frequency band, and coherence distances of signal and noise among sensors for a particular array [Wan96b], [Wan98a]. All channels are used in the initial configuration. Channel group CDFs may need to be tuned for arrays after a period of operation.

The following baseline CDF is used in 3-C seismic stations:

```
# @(#){sta}-beam.par     1.1    {mm/dd/yy}

beam-sta={sta}

#!BeginTable beam-group
|group      |
vertical
horizontal
#!EndTable

#!BeginTable vertical

|sta        |chan         |wgt|
{sta}        BHZ            1
#!EndTable

#!BeginTable horizontal
|sta        |chan         |wgt|
{sta}        BHN            1
{sta}        BHE            1
#!EndTable
```

The following baseline CDF is used in channel groups for a seismic array. The seismic array has *N* vertical sensors (*{ar}*`01`, *{ar}*`02`, `...`, *{ar}*`N`) and at least one 3-C station (*{ar}*`01`).

```
# @(#){sta}-beam.par     1.1   {mm/dd/yy}

beam-sta={sta}

#!BeginTable beam-group
|group     |
vertical
{ar}01
horizontal
#!EndTable

#!BeginTable vertical
|sta       |chan        |wgt|
{ar}01      SHZ           1
{ar}02      SHZ           1
..........
..........
{ar}N       SHZ           1
#!EndTable

#!BeginTable {ar}01
|sta       |chan        |wgt|
{ar}01      SHZ           1
#!EndTable

#!BeginTable horizontal
|sta       |chan        |wgt|
{ar}01      SHN           1
{ar}01      SHE           1
#!EndTable
```

The following baseline CDF is used in the channel group for hydroacoustic stations:

```
# @(#){sta}-beam.par     1.1   {mm/dd/yy}

beam-sta={sta}

#!BeginTable beam-group
|group     |
edchan       # or spchan
#!EndTable

#!BeginTable edchan (or spchan and set sp to chan below)
|sta       |chan        |wgt|
{sta}       ed           1
#!EndTable
```

The following baseline CDF is used in the channel group for infrasonic stations. The infrasonic array has four sensors (*{ar}*`01`, *{ar}*`02`, *{ar}*`03`, and *{ar}*`04`):

```
# @(#){sta}-beam.par     1.1   {mm/dd/yy}

beam-sta={sta}

#!BeginTable beam-group
|group     |
 group0
#!EndTable

#!BeginTable group0
|sta       |chan        |wgt|
{ar}01      BDF           1
{ar}02      BDF           1
{ar}03      BDF           1
{ar}04      BDF           1
#!EndTable
```

Detection Beam: {sta}-beam.par

Directory: `$config/app_config/DFX/beam/detection`

This CDF defines a set of steering beams for signal detection in *DFX*. In these files, detection beams are defined by beam identifier (ID), beam type, detection threshold of signal-to-noise ratio (snr), steering azimuth and slowness, filter design, and channel group. The beamforming CDF has the same filename as the channel group CDF for a given station.

The detection beams for a particular station should be generated systematically, based on properties of signals, noise conditions, and station configuration (array geometry). Super-size arrays (for example, NOA) require special configuration [Fye97]. The baseline beamforming files provided in this section are used for the initial implementation and may require tuning after a period of operation. The database value for **static.siteaux.***snthrsh* should be set to the minimum threshold (snr) of the vertical coherent beams. The F-k parameters may need to be updated if the beamforming recipe has been changed (see "F-k Analysis: {sta}-fk.par" on page 26).

The depth-phase SNR beam recipes must be defined for seismic stations to reflect the following filter set. The recipes are named *dpXXYY*, where *XX* is the low cutoff filter and *YY* is the high cutoff filter, without the decimal (for example, 0.5 -> 05).

(0.1–1.0, 0.2–1.5, 0.4–1.5, 0.5–2.0, 0.7–2.0, 0.8–3.0, 1.0–2.0, 1.0–2.5, 1.5–3.0, 2.0–4.0, 3.0–6.0).

Some beams have identifiers (beam IDs) that start with *Threshold Monitoring* (*TM*) in the beam CDFs for some stations. These beams are used for the *TM* system and are not required for conventional signal detection. Seismologists define *TM* beams for specific stations [Kva97b].

Six baseline files are described: (1) file for seismic 3-C stations, (3) files for seismic arrays, (1) file for hydroacoustic stations, and (1) file for infrasonic arrays.

Steering beams cannot be defined for seismic 3-C stations. All beams have zero values of steering azimuth and slowness. Several frequency bands are defined for detection beams spanning the frequency range of signals at local, regional, and teleseismic ranges. Initial detection thresholds are selected based on PIDC operations and offline experiments [Yan97].

The following baseline CDF is used in detection beams for seismic 3-C stations:

```
# @(#)   {sta}-beam.par     1.1     {mm/dd/yy}
par=$(PARDIR)/beam/$(sta)-beam.par
#!BeginTable beam-recipe
|name     |type|rot |std|snr    |azi  |slow    |phase |flo    |fhi    |ford|zp|ftype|group      |
 Z0515     coh  no    0    3.50   0.0   0.000   -       0.50   1.50   3     0  BP    vertical
 Z1020     coh  no    0    3.50   0.0   0.000   -       1.00   2.00   3     0  BP    vertical
 Z1530     coh  no    0    4.00   0.0   0.000   -       1.50   3.00   3     0  BP    vertical
 Z2040     coh  no    0    4.00   0.0   0.000   -       2.00   4.00   3     0  BP    vertical
 Z3060     coh  no    0    5.00   0.0   0.000   -       3.00   6.00   3     0  BP    vertical
 Z4080     coh  no    0    6.00   0.0   0.000   -       4.00   8.00   3     0  BP    vertical
 H0515     inc  no    0    5.50   0.0   0.000   -       0.50   1.50   3     0  BP    horizontal
 H1020     inc  no    0    5.50   0.0   0.000   -       1.00   2.00   3     0  BP    horizontal
 H1530     inc  no    0    5.50   0.0   0.000   -       1.50   3.00   3     0  BP    horizontal
 H2040     inc  no    0    5.50   0.0   0.000   -       2.00   4.00   3     0  BP    horizontal
 H4080     inc  no    0    5.50   0.0   0.000   -       4.00   8.00   3     0  BP    horizontal
 V2040     inc  no    1    -1.00  0.0   0.000   -       2.00   4.00   3     0  BP    vertical
 mb_beam   coh  no    0    -1.00  -1.0  -1.000  -       0.80   4.50   3     1  BP    vertical
#!EndTable
```

Small aperture arrays, also called regional arrays, have better coherence properties for regional seismic phases, but coarser resolution of slowness and azimuth than large arrays. Examples of small-aperture arrays in the IMS are ARCES and GERES. The baseline detection recipe includes sets of regional phase detection beams and teleseismic detection beams [Wan98b].

The following recipe assumes the first two letters (*{bs}*) of the array name as the first part of beam ID:

```
# @(#){sta}-beam.par     1.1    {mm/dd/yy}
par=$(PARDIR)/beam/$(sta)-beam.par
#!BeginTable beam-recipe
|name       |type|rot  |std|snr   |azi |slow     |phase |flo    |fhi    |ford|zp|ftype|group
 {bs}_001    coh  no     0    3.50   0.0  0.0000   -       0.75    2.25    3     0  BP    vertical
.........................
.........................
#!EndTable
```

Table 2 summarizes the detection beams for small aperture seismic arrays. Blank cells in the table have the same values as cells above. All beams are coherent except V2040. All *ford*s are `3` and *ftype*s are `BP` except for beam fkb whose *ford* is `0` and *ftype* is `NO`. The *zps* for all beams are `0` except for beam mb_chan and mb_beam, which are `1`.

TABLE 2: DETECTION BEAMS FOR SMALL SEISMIC ARRAYS

Beam Identification	SNR	Azimuth	Slowness (sec/km)	Frequency Band	Sensor Group
*{bs_}*1	3.5	0	0	0.75–2.25	vertical
*{bs_}*2-7	3.5	0,60,120,...	0.1061		
*{bs_}*8-17	5.0	0,36,72,...	0.3334		
*{bs_}*18	3.5	0	0	1.0–3.0	
*{bs_}*19-24	3.5	0,60,120,...	0.0796		
*{bs_}*25-30	4.0	30,90,150,...	0.1237		
*{bs_}*31-39	5.0	0,40,80,...	0.2225		
*{bs_}*40	4.0	0	0	2.0–4.0	
*{bs_}*41-46	4.0	0,60,120,...	0.0531		
*{bs_}*47-52	4.0	30,90,150,...	0.1061		
*{bs_}*53-61	4.5	0,40,80,...	0.1640		
*{bs_}*62-76	5.0	0,24,48,...	0.2857		
*{bs_}*77	5.0	0	0	3.0–6.0	
*{bs_}*78-83	5.0	0, 60, 120,...	0.0354		
*{bs_}*84-89	5.0	30, 90, 150,...	0.707		
*{bs_}*90-98	5.0	0, 40, 80,...	0.1061		
*{bs_}*99	5.0	0	0	4.0–8.0	
mb_chan	–1.0	–1	–1	0.8–4.5	*{ar}*`01`
mb_beam	–1.0	–1	–1	0.8–4.5	vertical
fkb	–1.0	–1	–1	0.8–3.5	
V2040	–1.0	–1	0	2.0–4.0	

Medium aperture arrays, also called teleseismic arrays, have good resolution for teleseismic seismic signals and better enhancement of snr than do smaller arrays. Examples of medium aperture arrays in the IMS are ASAR and CMAR. The following baseline detection recipe includes a set of teleseismic detection beams that have dense (3dB) beam coverage in wavenumber domain and a flat detection threshold (snr 4.0) [Wan96b]:

```
# @(#){sta}-beam.par     1.1  {mm/dd/yy}
par=$(PARDIR)/beam/$(sta)-beam.par
#!BeginTable beam-recipe
 |name     |type|rot |std|snr  |azi  |slow   |phase  |flo   |fhi   |ford|zp|ftype|group
 {bs}_001  coh  no   0   4.00  0.0   0.000   -       0.75  1.50   3    0  BP    vertical
 {bs}_002  coh  no   0   4.00  0.0   0.091   -       0.75  1.50   3    0  BP    vertical
 .....................
 .....................
#!EndTable
```

Table 3 summarizes the detection beams for medium aperture arrays. All beams except V2040 are coherent. All *ford*s are `3` and *ftype*s are `BP` except for beam fkb whose *ford* is `0` and *ftype* is `NO`. The *zp*s for all beams are `0` except for beam `mb_chan` and `mb_beam`, which are `1`.

TABLE 3: DETECTION BEAMS FOR MEDIUM SEISMIC ARRAYS

Beam Identification	SNR	Azimuth	Slowness (sec/km)	Frequency Band	Sensor Group
*{bs_}*01	4.0	0	0.0	0.75–1.5	vertical
*{bs_}*02-09	4.0	0,45,90,...	0.091		
*{bs_}*10-21	4.0	0,30,60,...	0.1237		
*{bs_}*22-39	4.0	0,20,40,...	0.193		
*{bs_}*40	4.0	0	0.0	1.0–2.0	
*{bs_}*41-48	4.0	0,45,90,...	0.068		
*{bs_}*49-60	4.0	0,30,60,...	0.094		
*{bs_}*61-75	4.0	0,24,48,...	0.120		

TABLE 3: DETECTION BEAMS FOR MEDIUM SEISMIC ARRAYS (CONTINUED)

Beam Identification	SNR	Azimuth	Slowness (sec/km)	Frequency Band	Sensor Group
*{bs_}*76	4.0	0	0.0	1.5–3.0	
*{bs_}*77-84	4.0	0,45,90,...	0.046		
*{bs_}*85-96	4.0	0,30,60,...	0.063		
*{bs_}*97-111	4.0	0,24,48,...	0.080		
*{bs_}*112-129	4.0	0,20,40,...	0.097		
*{bs_}*130-149	4.0	0,18,36,...	0.114		
*{bs_}*150	4.0	0	0.0	2.0–4.0	
*{bs_}*151-162	4.0	0,30,60,...	0.047		
*{bs_}*163-177	4.0	0,24,48,...	0.060		
*{bs_}*178-195	4.0	0,20,40,...	0.073		
*{bs_}*196-215	4.0	0,18,36,...	0.085		
*{bs_}*216	5.5	0	0	3.0–6.0	
*{bs_}*217	5.5	0	0	4.0–8.0	
mb_chan	–1.0	–1	–1	0.8–4.5	*{ar}*01
mb_beam	–1.0	–1	–1	0.8–4.5	vertical
fkb	–1.0	–1	–1	0.8–3.5	
V2040 (inc)	–1.0	0	0	2.0–4.0	

Large aperture arrays have good resolution and snr enhancement for teleseismic seismic signals. Examples of large aperture arrays at the IMS are WRA and YKA. The following baseline detection recipe includes a set of teleseismic detection beams that have dense slowness interval (3 dB) but only four symmetric azimuthal beams for each slowness; the detection recipe is tested to compromise computing time and resolution [Wan96b].

```
# @(#){sta}-beam.par     1.1  {mm/dd/yy}
par=$(PARDIR)/beam/$(sta)-beam.par
#!BeginTable beam-recipe
 |name     |type|rot |std|snr  |azi  |slow   |phase  |flo   |fhi   |ford|zp|ftype|group
 {bs}_001  coh   no   0    4.00  0.0   0.000   -       0.50  1.50   3    0  BP    vertical
 {bs}_002  coh   no   0    4.00  0.0   0.038   -       0.50  1.50   3    0  BP    vertical
 .....................
 .....................
#!EndTable
```

Table 4 summarizes the detection beams for large aperture arrays. All beams except V2040 are coherent. All *ford*s are `3` and *ftype*s are `BP` except for beam fkb whose *ford* is `0` and *ftype* is `NO`. The *zp*s for all beams are `0` except for beam `mb_chan` and `mb_beam`, which are `1`.

TABLE 4: DETECTION BEAMS FOR LARGE SEISMIC ARRAYS

Beam Identification	SNR	Azimuth	Slowness (sec/km)	Frequency Band	Sensor Group
*{bs_}*01	4.0	0	0.0	0.50–1.5	vertical
*{bs_}*02-05	4.0	0,90,180,...	0.038		
*{bs_}*06-09	4.0	45,135,225,...	0.066		
*{bs_}*10-13	4.0	0,90,180,...	0.094		
*{bs_}*14-17	4.0	45,135,225,...	0.1237		
*{bs_}*18-21	4.0	0,90,180,...	0.1640		
*{bs_}*22-25	4.0	45,135,225,...	0.2225		
*{bs_}*26	4.0	0	0	1.0–2.0	
*{bs_}*27-30	4.0	0,90,180,...	0.025		
*{bs_}*31-34	4.0	45,135,225,...	0.044		
*{bs_}*35-38	4.0	0,90,180,...	0.063		
*{bs_}*39-42	4.0	45,135,225,...	0.082		
*{bs_}*43-46	4.0	0,90,180,...	0.100		
*{bs_}*47-50	4.0	45,135,225,...	0.119		
*{bs_}*51-54	4.0	0,90,180,...	0.1237		

TABLE 4: DETECTION BEAMS FOR LARGE SEISMIC ARRAYS (CONTINUED)

Beam Identification	SNR	Azimuth	Slowness (sec/km)	Frequency Band	Sensor Group
*{bs_}*55	4.0	0	0	1.5–3.0	
*{bs_}*56-59	4.0	0,90,180,...	0.017		
*{bs_}*60-63	4.0	45,135,225,...	0.029		
*{bs_}*64-67	4.0	0,90,180,...	0.042		
*{bs_}*68-71	4.0	45,135,225,...	0.054		
*{bs_}*72-75	4.0	0,90,180,...	0.067		
*{bs_}*76-79	4.0	45,135,225,...	0.080		
*{bs_}*80-83	4.0	0,90,180,...	0.092		
*{bs_}*84	4.0	0	0	2.0–4.0	
*{bs_}*85-88	4.0	0,90,180,...	0.013		
*{bs_}*89-92	4.0	45,135,225,...	0.027		
*{bs_}*93-96	4.0	0,90,180,...	0.041		
*{bs_}*97-100	4.0	45,135,225,...	0.050		
*{bs_}*101-104	4.0	0,90,180,...	0.060		
*{bs_}*105-108	4.0	45,135,225,...	0.069		
*{bs_}*109	4.0	0	0	3.0–5.0	
*{bs_}*110-113	4.0	0,90,180,...	0.010		
*{bs_}*114-117	4.0	45,135,225,...	0.017		
*{bs_}*118-121	4.0	0,90,180,...	0.028		
*{bs_}*122-125	4.0	45,135,225,...	0.045		
*{bs_}*126-129	4.0	0,90,180,...	0.052		
`mb_chan`	–1.0	–1.0	–1.0	0.8–4.5	*{ar}*`01`
`mb_beam`	–1.0	–1.0	–1.0	0.8–4.5	vertical
`mb_beam`	–1.0	–1.0	–1.0	0.8–3.5	
V2040 (inc)	–1.0	0.0	0.0	2.0–4.0	

Steering beams cannot be defined for hydroacoustic stations. All beams have zero values of steering azimuth and slowness. Several frequency bands are defined for detection beams. To reduce the effect of high-energy whale calls in adjacent frequency bands, bandpass filters were designed with relatively steep roll-off (*ford* = 5) compared to those used in seismic processing (*ford* = 3). Initial detection thresholds are selected based on PIDC operations and offline experiments. The following baseline CDF is used in detection beams for hydroacoustic stations [Lan97f]:

```
# @(#) {sta}-beam.par      1.1 {mm/dd/yy}
par=$(PARDIR)/beam/$(sta)-beam.par
#!BeginTable beam-recipe
|name     |type|rot |std|snr    |azi  |slow   |flo   |fhi   |ford|zp|ftype|group |
 010020    coh  no   1   3.00    0.0   0.000   1.00   2.00   5    0  BP    edchan
 015030    coh  no   1   3.00    0.0   0.000   1.50   3.00   5    0  BP    edchan
 020040    coh  no   1   2.60    0.0   0.000   2.00   4.00   5    0  BP    edchan
 030060    coh  no   1   2.60    0.0   0.000   3.00   6.00   5    0  BP    edchan
 040080    coh  no   1   2.60    0.0   0.000   4.00   8.00   5    0  BP    edchan
 060120    coh  no   1   2.60    0.0   0.000   6.00   12.0   5    0  BP    edchan
 080160    coh  no   1   2.60    0.0   0.000   8.00   16.0   5    0  BP    edchan
 120240    coh  no   1   2.80    0.0   0.000   12.0   24.0   5    0  BP    edchan
 240480    coh  no   1   3.00    0.0   0.000   24.0   48.0   5    0  BP    edchan
 320640    coh  no   1   3.00    0.0   0.000   32.0   64.0   5    0  BP    edchan
 BB        coh  no   0   -1.00   0.0   0.000   1.00   48.0   5    0  BP    edchan
#!EndTable
```

The following baseline detection recipe is used in the IMS standard infrasonic arrays (aperture L ~1 km) [Kat98]:

```
# @(#){sta}-beam.par      1.1   {mm/dd/yy}
par=$(PARDIR)/beam/$(sta)-beam.par
#!BeginTable beam-recipe
 |name     |type|rot |std|snr  |azi  |slow    |phase  |flo   |fhi   |ford|zp|ftype|group

 {bs}_001  coh  no   0   3.00  0.0   5.1000   -       0.06   0.24   3    0  BP    group0
 {bs}_002  coh  no   0   3.00  5.0   5.1000   -       0.06   0.24   3    0  BP    group0
 .....................
```

Table 5 summarizes the detection beams for infrasonic arrays. All beams are coherent. The *ford* is 3, *ftype* is BP, and *zp* is 0 for all beams.

TABLE 5: DETECTION BEAMS FOR INFRASONIC ARRAYS

Beam Identification	SNR	Azimuth	Slowness (sec/km)	Frequency Band	Sensor Group
*{bs_}*0001-0072	3.0	0,5,10,...	5.10	0.12–0.50	group 0
*{bs_}*0073-0120	3.0	0,7.5,15,...	4.60		
*{bs_}*0121-0168	3.0	0,7.5,15,...	4.10		
*{bs_}*0169-0204	3.0	0,10,20,...	3.30		
*{bs_}*0205-0234	3.0	0,12,24,...	2.65		
*{bs_}*0235-0258	3.0	0,15,30,...	2.10		
*{bs_}*0259-0276	3.0	0,20,40,...	1.45		
*{bs_}*0277-0288	3.0	0,30,60,...	1.00		
*{bs_}*0289-0360	2.0	0,5,10,...	5.10	0.24–1.00	
*{bs_}*0361-0408	2.0	0,7.5,15,...	4.60		
*{bs_}*0409-0456	2.0	0,7.5,15,...	4.10		
*{bs_}*0457-0492	2.0	0,10,20,...	3.30		
*{bs_}*0493-0522	2.0	0,12,24,...	2.65		
*{bs_}*0523-0546	2.0	0,15,30,...	2.10		
*{bs_}*0547-0564	2.0	0,20,40,...	1.45		
*{bs_}*0565-0576	2.0	0,30,60,...	1.00		
*{bs_}*0577-0648	1.5	0,5,10,...	5.10	0.48–2.00	
*{bs_}*0649-0696	1.5	0,7.5,15,...	4.60		
*{bs_}*0697-0744	1.5	0,7.5,15,...	4.10		
*{bs_}*0745-0780	1.5	0,10,20,...	3.30		
*{bs_}*0781-0810	1.5	0,12,24,...	2.65		
*{bs_}*0811-0834	1.5	0,15,30,...	2.10		
*{bs_}*0835-0852	1.5	0,20,40,...	1.45		
*{bs_}*0853-0864	1.5	0,30,60,...	1.00		
*{bs_}*0865-0872	1.5	0,45,90,...	0.69		

Preconditioning Filter: {sta}-precond.par

Directory: `$config/app_config/DFX/precond`

This CDF specifies FIR filters to be used in preconditioning a hydroacoustic station's waveform to correct for instrument response. This CDF must be defined for stations with instrument response not flat to pressure.

```
# FILE:
#    WK30-precond.par
#
# DESCRIPTION
#    Recipe file for specifying station specific preconditioning
#    FIR filters to apply to the data
#

# This table lists the filters that are included in this
# file and are to be applied to the waveform.
# It's done this way so more than one filter can be specified

#!BeginTable precondlist
|tablename
     invresp
#!EndTable

# These are the FIR filter coefficients

#!BeginTable invresp
|coef
 2.55324E-02
 0.223587
 0.745742
 1.23217
 0.824989
-0.378878
-0.852511
-6.22975E-02
 0.411255
-0.220832
-0.621162
 .
 .
 .
-1.41434E-02
```

Infrasonic Data Detection: {sta}-infra.par

Directory: `$config/app_config/DFX/infra`

This CDF defines sets of parameters for infrasonic data detection processing in *DFX* [IDC5.2.1]. The infrasonic coincidence detector is implemented in *DFX*. This infrasonic detection algorithm computes received energy of steered beams and spatial coherence of a group of channels for the bandpass filtered waveform data and declares a detection when both energy and coherence are in excess of predefined thresholds.

An array-dependent CDF should be generated based on the array geometry. In particular, the following parameters depend on array geometry: *coherent-integration-time*, *update-time-of-processing, sta-time, gap-time, lta-time, xfk-ds, xfk-ds*, *azimuth-criterion*, *slowness-criterion*, *stat-lta-threshold*, and *coherent-threshold*. These later should be set to station-specific values in CDF *{sta}*`-infra.par`. The following CDF, `infra-detection.par`, contains the baseline values for infrasonic signal detection to be used at initial implementation:

```
# @(#) {sta}-infra.par  1.1 {dd/mm/yy}

filter-file-name-infra=$(dfx-par-dir)/infra Infra_FIR_BPF_Specification_Set.txt
refinement=n_ccc
coherent-integration-time=32.0
update-time-of-procesing=16.0
combination-criterion=1
scale-fs-flag=1
sta-vs-lta-fs-flag=0
lta-fs-weight=1.0
azimuth-criterion=22.0
slowness-criterion=0.5
slowness-bins-to-refine=5
slowness-width-for-peak-interpolate=0.5
sta-time=8.0
gap-time=300.0
lta-time=72.0
sta-lta-threshold=2.00
coherent-threshold=2.0
xfk-dk=0.124
xfk-ds=0.102
spctrl-est-window-type=1
spctrl-slope=-6.00
coherence-trace-channel-list=fsb,azb,vlb
```

Hydro_Detection Filter: {sta}_hydro.par

Directory: `$config/app_config/DFX/hydro`

This CDF defines the station-specific filters for DFX to compute hydro features. For stations with Nyquest frequency higher than 80 Hz, station filters, as shown below, are used. For others, appropriate filters must be provided.

```
# CCASEID: @(#) DGS05-beam.par CMR /main/1 11/02/200
# @(#)DGS05-beam.par  1.1 10/30/00

par=$(PARDIR)/beam/$(sta)-beam.par

# band pass filter frequencies used in DFX-hydro-detection.scm
# By decree, the following definitions shall be used:
#             low frequency band = filt2
#          medium frequency band = filt5
#            high frequency band = filt7
#           broad frequency band = filt8

#!BeginTable beam-recipe
|name     |type|rot  |std|snr   |azi  |slow  |flo   |fhi    |ford|zp|ftype|group    |
 filt1     coh  no    1   1.0    0.0   0.000  2.00   4.00    3    0   BP    edchan
 filt2     coh  no    1   1.0    0.0   0.000  3.00   6.00    3    0   BP    edchan
 filt3     coh  no    1   1.0    0.0   0.000  4.00   8.00    3    0   BP    edchan
 filt4     coh  no    1   1.0    0.0   0.000  6.00  12.00    3    0   BP    edchan
 filt5     coh  no    1   1.0    0.0   0.000  8.00  16.00    3    0   BP    edchan
 filt6     coh  no    1   1.0    0.0   0.000 16.00  32.00    3    0   BP    edchan
 filt7     coh  no    1   1.0    0.0   0.000 32.00  64.00    3    0   BP    edchan
 filt8     coh  no    1   1.0    0.0   0.000  2.00  80.00    3    0   BP    edchan
#!EndTable
```

Polarization Analysis for 3-C Stations: {sta}-polar.par

Directory: `$config/app_config/DFX/polar`

This CDF defines sets of parameters for 3-C polarization analysis in *DFX*. In polarization CDFs, the following four parameters are directly dependent on the station: *polar-sta-list*, *polar-chan-list*, *polar-dk*, and *polar-alpha*.

Polar-dk estimates measurement error and can be obtained from statistical analysis of observed data. *Polar-alpha* is the reciprocal of shear-wave velocity underneath the 3-C station and converts the apparent incident angle of a signal to slowness. The parameter *polar-alpha* needs to be tuned after a period of operation [Wan99a]. *Polar-ds* is preset and should be set to zero if Slowness-Azimuth Station Corrections (SASC) are implemented [Bon98], otherwise, it should be set to `0.03`.

The following baseline CDF is used in 3-C polarization analysis:

```
# @(#)   {sta}-polar.par     1.1     {mm/dd/yy}

polar-sta-list={sta}
polar-chan-list=BHE,BHN,BHZ
polar-dk=0.10
polar-alpha=0.30
polar-fonset=5.0
polar-flo=1.0
polar-fhi=4.0
polar-window=1.5
polar-overlap-fraction=0.333
polar-noise-lead=30.0
polar-noise-len=9.5
polar-signal-lead=1.5
polar-signal-len=5.5
polar-ds=0.0
```

The *polar-chan-list* should include the correct channel set for the particular station, including passband and gain code, and must be in the correct case. Thus, the *polar-chan-list* shown as `BHE,BHN,BHZ` above might alternatively be `be,bn,bz`; `se,sn,sz`; `ee,en,ez`; `SHE,SHN,SHZ`; `she,shn,shz`; `EHE,EHN,EHZ`; or `ehe,ehn,ehz`.

F-k Analysis: {sta}-fk.par

Directory: `$config/app_config/DFX/fk`

This CDF defines sets of parameters for automated F-k analysis in *DFX*. Array-dependent F-k CDFs should be generated based on the array geometry and the beamforming recipe. The baseline F-k files are only for initial implementation. The following related features of the array are used for setting F-k parameters in the beamforming recipe: aperture *(L)*, maximum sensor offset distance *(MOD)* to the reference sensor, wavenumber resolution *(R_3dB)* of the array, and frequency and slowness ranges *(beam_min_freq, beam_max_freq, beam_max_slow)*. In particular, parameters *fk-lead, fk-lag, fk-nslow,* and *fk-dk* depend on array geometry. The constraints in defining these parameters are as follows:

fk-max-slow ≥ *beam_max_slow*

fk-lead ≥ *MOD * fk-max-slow*

fk-lead + fk-lag ≥ *max(L, 2*MOD) * fk-max-slow + 1/beam_min_freq*

*fk-nslow = int(fk-max-slow/(R_3dB/(2π * beam_min_freq)))*

Fk-dk can be obtained from the theoretical resolution of an array or statistical analysis of observed data. *Fk-ds* is preset and should be set to zero if SASCs are implemented [Bon98], otherwise it should be set to `0.008`.

The following baseline CDF is used in F-k for seismic arrays. Three sets of array-dependent parameters are listed separately for different sized arrays.

```
# @(#)   {sta}-fk.par     1.1     {dd/mm/yy}

fk-max-slow=0.36
fk-filter-onset=6.0
fk-flo=0.75
fk-fhi=8.0
fk-fzp=0
fk-forder=3
fk-ds=0.0

# Array size dependent parameter, choose one of the following three sets
# for small array (L< 5km)
fk-lead=1.0
fk-lag=2.5
fk-nslow=55
fk-dk=0.15

# for medium array (L~10 km)
# fk-lead=2.0
# fk-lag=3.5
# fk-nslow=65
# fk-dk=0.04

# for large array (L~20 km)
# fk-lead=4.0
# fk-lag=6.0
# fk-nslow=85
# fk-dk=0.02
```

No CDF is used in F-k for infrasonic arrays; the processing parameter values for the analysis are set internally by the *DFX* automatic infrasonic detection application. The fk recipes, automatically invoked from within *DFX/libinfra*, are constructed dynamically within the C-code functions of *DFX/libinfra* to employ parameter values, which are governed by the nature of the signal data in hand. The only fk-spectrum recipe parameters that are brought in externally, via the site-dependent infra recipe files in `$config/app_config/DFX/infra/{sta}-infra.par`, are `fk-ds` and `fk-dk`. These parameters are called *xfk-ds* and *xfk-dk*, respectively, in these recipe files.

Infrasonic Amplitude Calculation: {sta}_infra_amp.par

Directory: `$config/app_config/DFX/amp`

This CDF defines sets of parameters to compute amplitudes for infrasonic detections. The following CDF contains the baseline values to be used at initial implementation. If sensor information for the station is available, set the *name* field of the **amprec** table to `"INFRA_"`; otherwise, set it to `"-"` (hyphen). The *beamrec* field of this table refers to the detection beam identification for the station as defined in Table 5 on page 22.

```
#!BeginTable amprec
| name      |phase|tirec    |beamrec  |mtype       |mvalue|iresp|fresp|
INFRA_       _      NIL_INFR DL_0001   peak_trough      -1     1     1
#!EndTable
amp-min-sta-fraction=0.1
amp-min-sta-len-fraction=0.9
amp-decimation-fraction=0.0
amp-filt-rolloff=37.5
amp-use-interp-period=1
amp-inst-resp-units="d"
amp-inst-resp-type="theoretical"
```

STAPRO

Neural Network Weights for 3-C Seismic Stations: ipnnwts.tbl

Directory: `$config/earth_specs/STAPRO`

This CDF defines the neural-network weights of all 3-C seismic stations used in *StaPro*. This file should be updated after creating or updating a station-specific weight file in the directory `$config/earth_specs/STAPRO/ipnnwts.dir`. To update this file, `compile` is typed in the directory `$config/earth_specs/STAPRO/ipnnwts.dir`, then the new file `ipnnwts.tbl` is copied to the directory `$config/earth_specs/STAPRO`.

Neural Network Weights for 3-C Seismic Stations: {sta}.nn

Directory: `$config/earth_specs/STAPRO/ipnnwts.dir`

This CDF defines a set of seismic station-specific neural-network weights that are used to compile a single file of the neural-network weights for all 3-C stations to be used by *StaPro* [Wan97b], [Wan98c]. The current default neural-network weights were generated from a one-year observation of data from a primary IMS station, STKA, using an adaptive training approach. Offline testing and online operation show that this set of neural-network weights works well for other stations and can serve as a default weight before station-specific weights are available. This station-specific file should be updated if neural-network training has occurred for a specific station after a period of operation. The neural-network weight file of the whole system, `ipnnwts.tbl`, should be updated after creating or updating a station-specific weight file.

Neural Network Weights for Hydroacoustic Stations: hydro_{sta}.weights

Directory: `$config/earth_specs/STAPRO`

This CDF defines a set of neural-network weights for phase identification of hydroacoustic stations used by *StaPro*, [LeB97]. For a new hydroacoustic station, default neural-network weights are not available. *StaPro* will use a set of default rules to classify phase type. After a period of operation, station-specific neural-network weights can be generated from neural-network training. No action has to be taken for a new station unless neural-network weights are available at the same time.

Bayes Probabilities: bayes.tbl

Directory: `$config/earth_specs/STAPRO`

This CDF contains Bayesian probabilities that are used to identify a regional S phase as Sn based on the time difference (S – P), frequency, velocity, and horizontal-to-vertical power ratio. See [IDC5.2.1] for details on the Bayesian method. Station-specific values are specified in the file. The default probabilities come from station NORES and are used when station-specific values are not available. After a period of operation, station-specific values can be generated (see [IDC5.2.1]). No action has to be taken for a new station unless new probabilities are available and can be added to the file.

Slowness-Azimuth Station Corrections: sasc.{sta}

Directory: `$config/earth_specs/SASC`

These CDFs, which define tables for SASC, are used in *StaPro* and *GA*. The SASC tables in these files were generated from previous long-time observations and statistics [Bon98]. For a new station, a file called `sasc.dummy`, which is located in directory `$config/earth_specs/SASC`, should be copied. The dummy file includes only a default slowness modeling error. This file should be updated, if possible, after a period of operation.

The parameters *polar-ds* and *fk-ds* are preset. With the introduction of SASCs, they are replaced by modeling errors provided by SASCs. Therefore, they are set to `0.0` in `$config/app_config/DFX/`*{polar,fk}*/*{sta}*-*{polar,fk}*`.par`. The parameter *dels* should be set to `0.0` in `$config/app_config/interactive/XfkDisplay/recipes/`*{sta}*`.par`.

Transmission Loss Specification: idc_tlsf.defs

Directory: `$config/earth_specs/MAG/tlsf`

This CDF defines all regionalized transmission loss (TL) knowledge, which is used for magnitude calculation in *StaPro*, *GAassoc*, *GAconflict*, and *EvLoc*. This existing file provides a central control point to the Transmission Loss Specification File (TLSF). This file lists station-specific models and is updated if a new station is implemented or a calibration study has been done for an existing station.

This file is updated for a new station by adding one line under the section with TL Model to the file `idc_tlsf.defs`.

```
# Sta      Phase
# Name     TLType    TL Model          Type     Chan      Comments
# -----    ------    ---------------   -----    ------    ----------------
{sta}       ml        mcoefs_def1         -         -
```

The TL Model may have to be different from `mcoefs_def1` in the previous example if the attribute *static.instrument.ncalper* is not 1 second. The appropriate TL Model is provided in Table 6.

TABLE 6: DEFAULT TRANSMISSION LOSS MODELS

static.instrument.ncalper	Default TL Model
0.2	`mcoefs_def02`
0.3125	`mcoefs_def03`
0.5	`mcoefs_def05`
1.0	`mcoefs_def1`
10.0	`mcoefs_def10`
50.0	`mcoefs_def50`

However, if a new station has a *ncalper* value not listed in Table 6, a new default model file needs to be created in the directory `$config/earth_specs/MAG/regional/mag_coefs`. The new TL file must have the suffix `.ml`, for example, `mcoefs_def99.ml`, and is formatted as other default files (for example, `mcoefs_def1.ml`), but with magnitude corrections calculated according to the following formula [Wan99b]:

$correction = a + b*R + c*\log(R)$,

where R is in kilometers (distances in the beginning of the magnitude correction file are in degrees), and $a = -4.57 - \log10(ncalper)$; $b = -0.000312$; $c = 2.7337$.

Velocity Model: ims.defs

Directory: `$config/earth_specs/TT/vmsf`

This CDF contains the velocity model and its directory location to be used. Station and phase-dependent modeling errors and bulk station correction terms are also defined in this CDF.

Magnitude Definition: idc_mdf.defs

Directory: `$config/earth_specs/MAG/mdf`

This CDF is the magnitude description file. It describes high-level magnitude specification, control settings, and mappings to the transmission loss information.

HAE

Hydroacoustic Azimuth Estimation: hae_net{GRP}.par

Directory: `$config/app_config/automatic/HAE`

This CDF defines the network-specific parameters for hydroacoustic azimuth estimation. The `hae_net`*{GRP}*`.par` file is referenced through the `hae.par` file.

```
#
# Required pars not supplied here:
#      start-time
#      end-time
#      net
#
# this par loads the network specific hae par file
###
par=$(IMSPAR)
hae-dir=$(AUTOMATIC-DIR)/HAE
# Database parameters
database-vendor=$(DATABASE_VENDOR)
database-account=$(EXPERTDB)
database-server=NULL
# Database tables
arrival-table=arrival
in-hydro_features-table=hydro_features
in-affiliation-table=affiliation
in-site-table=site
in-sitechan-table=sitechan
in-wfdisc-table=wfdisc
hydro_assoc-table=hydro_assoc
hydro_arr_group-table=hydro_arr_group
# Channel List
chan-list=sp’,’ed
# Verbosity output level
# 1 none
# 2 Low: Error, Warning
# 3 Med:
# 4 HIGH: Everything
verbosity=3
# Network dependent par -- if net not defined this will equal hae-net.par
# otherwise there should be a par file called hae-netNETWORK.par
hae-net-parfile=hae-net$(net).par
par=$(hae-dir)/$(hae-net-parfile)


# CCASIED: @(#) hae-netDGN_GRP.par CMR /main/testbed_7.0/1 03/21/2001
# DGN_GRP network par file for HAE
# gets called in hae.par
#
# DGN_GRP consists of three hydrophones in the northern triad
# at Diego Garcia
```

```
#
# Author: J. Hanson  MSO-SAIC
#
# extra time added to time interval
extend-time=200.
lookback-time=260.


# Nominal T-Phase velocity (Km/sec)
vel=1.472
# Extra Time delay
extra-time=30.0
# Minimum score
min-score=0
# waveform filter parameters
lo-corner-wf=4.0
hi-corner-wf=8.0
npoles-wf=3
filter-type-wf=BP
zero-phase-flag-wf=1
# envelope filter parameters
use-envelope=0
hi-corner-env=1.0
npoles-env=3
filter-type-env=LP
zero-phase-flag-env=1
# Azimuth parameters in deg
az-begin=0.0
az-end=359.95
az-delta=0.05
# Azimuth error parameters
az-error=5
az-epsilon=0.04
sigma-time=0.2
# Slowness parameters in s/km
slow-begin=0.6735
slow-end=0.6735
slow-delta=0.001
# Normalization constants
time-resid=0.0
corr=0.0
tt-diff=1.0
nsta=0.0
```

TIN_SERVER

Time Interval by Network: tin_{GRP}.par

Directory: `$config/app_config/distributed/tin`

This CDF contains site-specific parameters for the DACS application server, *tin_server*, for creating time intervals for hydroacoustic groups by network, *HAE*. This file should be created after a new hydroacoustic group, *{GRP}*, is defined. The station-specific parameters in this CDF are *role*, *tin-interval-name*, *tin-timestamp-name* and *tis-per-interval*. *tin-goal-decay-minutes* is a comma or white-space delimited vector of ascending positive integers. The integers represent minutes in real-time beyond the end of the current interval. A threshold value is assigned to each minute's value by using the *tin-goal-decay-threshold* parameter. As time elapses past the end of an interval, the time difference yields a threshold value by truncating the time to the lower minutes entry and matching with the threshold vector. The threshold values are compared against the data counts obtained from the *get-data-count*. For example:

tin-goal-decay-minutes=`"0, 5, 10, 15, 20"` and *tin-goal-decay-threshold*

```
# CCASEID: @(#) tin_DGS_GRP.par CMR /main/1 02/12/2001
# tin_DGS_GRP.par
#
# tin_server par file for creating DGS_GRP intervals.
#

role=TIN-DGS

par=$(IMSPAR)
par=$(DISTRIBUTED)

database=$(EXPERTDB)

logfile=$(LOGDIR)/%jdate/dacs/$(role)-%host-%pid
errfile=$(logfile)

sleep-time=30

# if not set, then no messages sent
physical-dest=HAE

lookback=14400

# For HAE these values must be same as tis par file for detection processing
target-interval-size=600
min-interval-size=600
max-interval-size=3600
interval-snapto=600
```

```
tin-interval-class=HAE
tin-interval-name=DGS_GRP
tin-timestamp-class=TIN
tin-timestamp-name=DGS_GRP
tin-interval-state=queued
tin-interval-state-no-data=skipped
tin-running-state=running

tis-interval-class=TI/S
tis-done-state=ready
tis-search-slop=120

# TIN creation algorithm
tis-per-interval=1
tin-goal-decay-minutes="0, 5, 20, 40, 50, 52"
tin-goal-decay-threshold="3, 3, 3, 3, 2, -1" # mult. by tis-per-interval

make-inactive-intervals=1

# database queries
#
# find prior intervals
# get-init-intervals="SELECT * from interval\
# where class = '$(tin-interval-class)'\
# and state in ('$(tin-interval-state)', '$(tin-running-state)')"

# update existing intervals one at a time
update-tin-interval-state="UPDATE interval\
set state = '$(tin-interval-state)', \
moddate = sysdate + '$(timezone-difference)' \
where state = '$(tin-interval-state-no-data)'\
and class = '$(tin-interval-class)'\
and name = '$(tin-interval-name)'\
and time between %.3f - 1 and %.3f + 1\
and endtime between %.3f - 1 and %.3f + 1"

# get last TIN time from timestamp
get-tin-time = "SELECT max(time) from timestamp\
where procclass ='$(tin-timestamp-class)'\
and procname ='$(tin-timestamp-name)'"

# update TIN time in timestamp
update-tin-time = "UPDATE timestamp set time = %.3f\
where procclass = '$(tin-timestamp-class)'\
 and procname = '$(tin-timestamp-name)'"

# get last TI/N time from interval
get-interval-times = "SELECT max(endtime) from interval\
where class = '$(tin-interval-class)'\
and name = '$(tin-interval-name)'\
and state != '$(tin-interval-state-no-data)'"

# get count of finished TI/S's
get-data-count = "SELECT count(*) from interval\
where class = '$(tis-interval-class)'\
and name in \
(select sta from affiliation where net = '$(tin-interval-name)')\
and state = '$(tis-done-state)'\
and endtime between %.3f + 3 * $(tis-search-slop) and\
%.3f + $(tis-search-slop)"

tin-verbose=3
```

Chapter 3: Configuring Network Processing

This chapter describes the CDFs needed to configure the processing application software for the network processing of seismic, hydroacoustic, and infrasonic data. The software is used as a framework for organizing the parameters and CDFs that must be changed to add a new station, modify information about an existing station, or tune the processing. A process model first illustrates each step in the network processing function. A table then summarizes the CDFs used in each step. Descriptions of the parameters in each CDF follow the table.

Chapter 3: Configuring Network Processing

The overall functional model of the system is shown in Figure 4 on page 6. Figure 6 shows the steps in the network processing function. The processing application software, which is configured using the parameters stored in CDFs, executes the steps in this function. The processing application software *GAcons* performs step 1, *GAassoc* and *GAconflict* perform steps 2–4, and *WaveExpert* performs step 6.

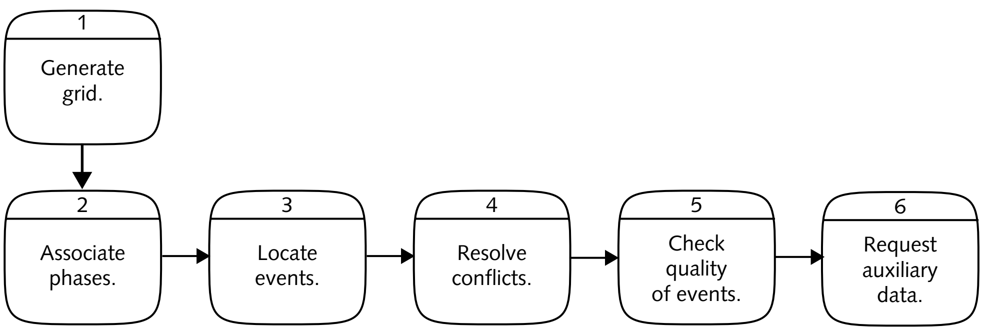


FIGURE 6. NETWORK PROCESSING

The CDFs used for network processing are grouped in Table 7 according to the processing steps illustrated in Figure 6. The first column in the table corresponds to the processing step number. Each CDF and the parameters associated with it is described in the following sections under the appropriate application software processing step.

TABLE 7: NETWORK PROCESSING CONFIGURATION DATA FILES

Step	Application	CDF	Description	Data Type[1]	Ref. Page
1	*GAcons*	`GAcons.par`	build GA grid files	SHI	39
2, 3, 4	*GAassoc*	`sasc.`*{sta}*	tables for SASC	SI	40
	GAconflict	`idc_tlsf.defs`	magnitude estimation	S	40
		`BLK.`*{sta}*`.T`	station-specific blockage grid for hydroacoustic stations	H	40
6	*WaveExpert*	`WaveExpert.par`	station-specific parameters for waveform request of the auxiliary seismic stations	S	40

1. S = seismic, H = hydroacoustic, I = infrasonic

GACONS

Constructing GA Grid File: GAcons.par

Directory: `$config/app_config/automatic/GAcons`

The GA grid file needs to be rebuilt when adding a new station into the operational processing. The parameter *jdate* in the CDF `GAcons.par` must be set to the Julian date of the day for which the grid is to be computed.

GA grid files are built by running:

```
GAcons par=GAcons.par
```

GAASSOC, GACONFLICT

Slowness-Azimuth Station Corrections: sasc.{sta}

Directory: `$config/earth_specs/SASC`

Previously defined on page 30.

Transmission Loss Specification: idc_tlsf.defs

Directory: `$config/earth_specs/MAG/tlsf`

Previously defined on page 31.

Hydroacoustic Blockage Grids: BLK.{sta}.T

Directory: `$config/earth_specs/BLK_OSO`

This CDF defines station-specific blockage grids for hydroacoustic stations [LeB97]. Only the hydroacoustic detections within unblocked regions should be associated with an event by *GA* and/or *Analyst Review Station* (*ARS*). Stations without blockage files are treated as blocked. No action has to be taken for a new station unless a blockage file is available.

WAVEEXPERT

Waveform Requests from Auxiliary Seismic Stations: WaveExpert.par

Directory: `$config/app_config/automatic/WaveExpert`

This CDF for *WaveExpert* defines station-specific parameters for waveform requests of the auxiliary seismic stations. Two station-specific parameters are defined in this CDF if global default values need to be overridden.

One parameter, the expected detection threshold of a specific station, may be given using the following form:

{STA}`-prob_snr_threshold=`*{value}*

For example, requiring a predicted snr threshold of 3.4 for station INK instead of the default value 2.0 is specified as follows:

`INK-prob_snr_threshold=3.4`

A noisy station would have a higher threshold, which would give a lower probability to request waveforms from this station.

Another parameter, a list of station components from which waveform data are requested, may be given using the following form:

{STA}`-components=`*{component list}*

By default, components = `SHZ,SHN,SHE,BHZ,BHN,BHE.` To use different components or a different subset of components than the default, for example, `SHZ,SHN,SHE` for station NIL, specify:

`NIL-components=SHZ,SHN,SHE`

If station-specific parameters are not given, default values are used. Default values are used for new stations unless station-specific values are known to be different than the defaults.

The following examples are from the CDF `WaveExpert.par`:

```
##  station-specific parameters
##
##  WaveExpert will use global default values if not specified below
##  $(sta)-prob_snr_threshold is the threshold for WaveExpert requests
##  $(sta)-components are the components WaveExpert requests.
##
INK-prob_snr_threshold=3.4
NIL-components=SHZ,SHN,SHE
```

Chapter 4: Configuring Interactive Processing

This chapter describes the CDFs needed to configure the processing application software for the interactive processing of seismic, hydroacoustic, and infrasonic data. The software is used as a framework for organizing the parameters and CDFs that must be changed to add a new station, modify information about an existing station, or tune the processing. A process model first illustrates each step in the interactive processing function. A table then summarizes the CDFs used in each step. Descriptions of the parameters in each CDF follow the table.

Chapter 4: Configuring Interactive Processing

The overall functional model of the system is shown in Figure 4 on page 6. Figure 7 shows the steps in the interactive processing function. The processing application software, which is configured using parameters stored in CDFs, executes the steps in this function. The processing application software *DFX* performs steps 1–3, *ARS* performs steps 1 and 4, and *XfkDisplay* performs step 3.

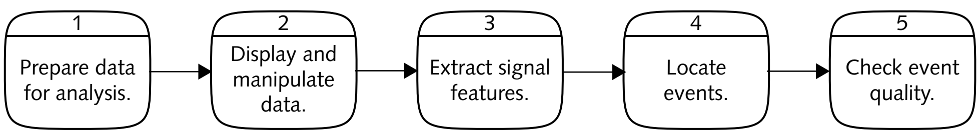


FIGURE 7. INTERACTIVE PROCESSING

The CDFs used for interactive processing are grouped in Table 8 according to the processing steps illustrated in Figure 7. The first column in the table corresponds to the processing step number. Each CDF and the parameters associated with it is described in the following sections under the appropriate application software processing step.

TABLE 8: INTERACTIVE PROCESSING CONFIGURATION DATA FILES

Step	Application	CDF	Description	Data Type[1]	Ref. Page
	DFX	*{sta}*`.par`	general station parameters needed for processing	SHI	45
1	*DFX*	*{sta}*`-beam.par`	channel groups for beamforming or cross-correlation	SHI	46
	DFX, ARS	*{sta}*`-beam.par`	standard beams steered to origin location for automated system	SI	46
3	*DFX*	*{sta}*`-infra.par`	station-dependent parameters for infrasonic data processing	I	47
		{sta}`-polar.par`	parameters for 3-C polarization analysis	S	47
		{sta}`-fk.par`	parameters for automated frequency-wavenumber (F-k) analysis	SI	47
	XfkDisplay	`XfkDisplay.par`	general configuration parameters	SI	47
		{sta}`_fk.par`	site-specific parameters	SI	48
		{sta}`.par`	dynamic signal processing parameters	SI	48
4	*ARS*	`sasc.`*{sta}*	tables for SASC	SI	50
		`BLK.`*{sta}*`.T`	station-specific blockage grid for hydroacoustic stations	H	50

1. S = seismic, H = hydroacoustic, I = infrasonic

DFX

General Station Parameters: {sta}.par

Directory: `$config/station_specs`

Previously defined on page 10.

Channel Grouping: {sta}-beam.par

Directory: `$config/app_config/DFX/beam`

Previously defined on page 12.

DFX, ARS

Origin Beams: {sta}-beam.par

Directory: `$config/app_config/DFX/beam/originbeam`

This CDF defines sets of coherent and incoherent standard beams steered by *DFX* to the origin location determined by the automated system. The following baseline CDF is defined only for seismic arrays:

```
# @(#) {sta}-beam.par     1.1   {mm/dd/yy}
par=$(PARDIR)/beam/$(sta)-beam.par
#!BeginTable beam-recipe
|name    |type |rot |std |snr    |azi   |slow    |phase |flo    |fhi    |ford |zp |ftype|group      |
 cb      coh   no   0    -1.00   -1.0   0.125    P      0.50    8.00    3     0   BP    vertical
 cbtmp   coh   no   0    -1.00   -1.0   0.125    P      0.50    8.00    3     0   BP    vertical
 CBtmp   coh   no   0    -1.00   -1.0   0.125    P      0.50    8.00    3     0   BP    vertical
 ib      inc   no   0    -1.00   -1.0   0.222    S      2.00    4.00    3     0   BP    vertical
 ibtmp   inc   no   0    -1.00   -1.0   0.222    S      2.00    4.00    3     0   BP    vertical
 hb      inc   no   0    -1.00   -1.0   0.250    Lg     2.00    4.00    3     0   BP    horizontal
 hbtmp   inc   no   0    -1.00   -1.0   0.250    Lg     2.00    4.00    3     0   BP    horizontal
#!EndTable
```

The coherent beam *cb* is constructed by the automated system using *DFX*, just after the *SEL3* is completed. The analyst may create a *cbtmp* on-the-fly. The beam may use a new location determined by the analyst, who can remove some channels from the beam if necessary. The beam *cbtmp* is for the regional distance beam-on-the-fly (along with *hbtmp* and *ibtmp*), and the beam *CBtmp* is the teleseismic distance beam-on-the-fly. These beams can be tuned separately to split regional and teleseismic phases after a period of operation.

DFX

Infrasonic Data Processing: {sta}-infra.par

Directory: `$config/app_config/DFX/infra`

Previously defined on page 24.

Polarization Analysis for 3-C Stations: {sta}-polar.par

Directory: `$config/app_config/DFX/polar`

Previously defined on page 25.

F-k Analysis: {sta}-fk.par

Directory: `$config/app_config/DFX/fK`

Previously defined on page 26.

XFKDISPLAY

General Configuration of XfkDisplay: XfkDisplay.par

Directory: `$config/app_config/interactive/XfkDisplay`

A station name is added to the *array_list,* which is defined in the general CDF `XfkDisplay.par`:

`array_list="ARCES FINES ....... ZAL` *{sta}*`"`

Additionally, one line is added to this file:

{sta}`_par=$(PARDIR)/XfkDisplay/`*{sta}*`_fk.par`

A station name is added in the *recipe_list* defined in this file:

`recipe_list="ARCES FINES ....... ZAL` *{sta}*`"`

One line is added to this file:

{sta}`_recipe=$(PARDIR)/XfkDisplay/recipes/`*{sta}*`.par`

Station-specific Configuration of XfkDisplay: {sta}_fk.par

Directory: `$config/app_config/interactive/XfkDisplay/arrays`

For each station this CDF defines groups of static processing parameters for *XfkDisplay*. All parameters are self-explanatory; arrays use *network,* and 3-C stations use *site-list* to define the site used.

The following baseline CDFs are used for 3-C stations and arrays, respectively:

```
# @(#) {sta}_fK.par     1.1  {mm/dd/yy}
fktype={sta}
site_db=$(database)
sta="{sta}"
site_list="{sta}"
chan_list="bz,bn,be"  #or other type of 3C sensors, e.g. "sz,sn,se".
delk = 0.10 # for 3C stations
dels = 0      # if SASC implemented,otherwise, dels = 0.03
```

```
# @(#) {sta}_fK.par     1.1  {mm/dd/yy}
fktype={sta}
site_db=$(database)
sta="{sta}"
network={sta}
chan_list="sz"      # or other type of vertical sensor, e.g., "ez."
delk = 0.15   # for small arrays, or 0.04 for medium arrays, 0.02 for large arrays
dels = 0      # if SASC implemented,otherwise dels = 0.008
```

Processing Configuration of XfkDisplay: {sta}.par

Directory: `$config/app_config/interactive/XfkDisplay/recipes`

For each station, this CDF defines groups of dynamic station-specific processing parameters for interactive F-k or 3-C polarization analysis used in *XfkDisplay*. To be consistent, some parameters should be the same as those defined in automatic processing, although they may have different names. These parameters may also be set interactively based on the analyst's judgement.

Tables 9 and 10 provide baseline CDFs for 3-C stations and arrays, respectively.

TABLE 9: BASELINE PARAMETERS OF INTERACTIVE POLARIZATION ANALYSIS FOR 3-C STATIONS

Parameters in XfkDisplay	Baseline
fktype	*{sta}*
three_comp	1.0
power_output	0.0
min_sta	1.0
fklof	–1.0
fkhif	–1.0
band_width	2.0
max_inc	89.0
vel0	5.5
lead	1.5
lag	4.0
flo	1.0
fhi	4.0
fzp	0.0
forder	3.0

TABLE 10: BASELINE PARAMETERS OF INTERACTIVE F-K ANALYSIS FOR ARRAYS

	Baseline			
Parameters in XfkDisplay	Small Arrays	Medium Arrays	Large Arrays	Infrasonic Arrays
fktype		*{sta}*		
lead	1.0	2.0	4.0	16.0
lag	2.5	3.5	6.0	16.0

TABLE 10: BASELINE PARAMETERS OF INTERACTIVE F-K ANALYSIS FOR ARRAYS (CONTINUED)

Parameters in XfkDisplay	Baseline			
	Small Arrays	Medium Arrays	Large Arrays	Infrasonic Arrays
nslow	55.0	65.0	85.0	101.0
band_width	2.0	2.0	2.0	0.0
fklof	–1.0	–1.0	–1.0	0.12
fkhif	–1.0	–1.0	–1.0	2.0
flo	0.75	0.75	0.75	0.12
fhi	8.0	8.0	8.0	2.0
filter_onset				37.5
fzp		0.0		0.0
forder		3.0		8.0
max_slow		0.36		5.0

Slowness-Azimuth Station Corrections: sasc.{sta}

Directory: `$config/earth_specs/SASC`

Previously defined on page 30.

Hydroacoustic Blockage Grids: BLK.{sta}.T

Directory: `$config/earth_specs/BLK_OSO`

Previously defined on page 40.

Chapter 5: Configuring Post-analysis Processing

This chapter describes the CDFs needed to configure the processing application software for the post-analysis processing of seismic, hydroacoustic, and infrasonic data. The software is used as a framework for organizing the parameters and CDFs that must be changed to add a new station, modify information about an existing station, or tune the processing. A process model first illustrates each step in the post-analysis processing function. A table then summarizes the CDFs used in each step. Descriptions of the parameters in each CDF follow the table.

Chapter 5: Post-analysis Processing

The overall functional model of the system is shown in Figure 4 on page 6. Figure 8 shows the steps in the post-analysis processing function. The processing application software, which is configured using the parameters stored in CDFs, executes the steps in this function. The processing application software *EvLoc* performs step 1, and *DFX* performs step 5.

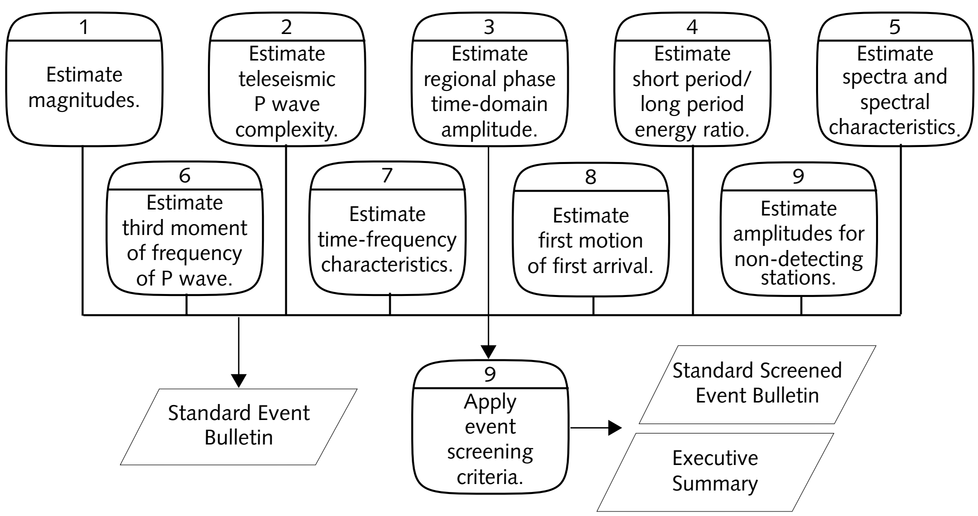


FIGURE 8. POST-ANALYSIS PROCESSING

The CDFs used for post-analysis processing are grouped in Table 11 according to the processing steps illustrated in Figure 8. The first column in the table corresponds to the processing step number. Each CDF and the parameters associated with it is described in the following sections under the appropriate application software processing step.

TABLE 11: POST-ANALYSIS PROCESSING CDFS

Step	Application	CDF	Description	Data Type[1]	Ref. Page
1	*EvLoc*	`idc_tlsf.defs`	all regionalized transmission loss (TL)	S	53
5	*DFX*	*{sta}*`-smult.par`	set of parameters for multiple spectrum analysis	S	53
		{sta}`-beam.par`	filters for *DFX* as used by event characterizations	H	55
9	*evsc_drv*	`evsc.par`	set of parameters for event screening calculations	SH	56

1. S = seismic, H = hydroacoustic, I = infrasonic

EVLOC

Transmission Loss Specification: idc_tlsf.defs

Directory: `$config/earth_specs/MAG/tlsf`

Previously defined on page 31.

DFX

Multiple Spectrum Analysis: {sta}-smult.par

Directory: `$config/app_config/DFX/smult`

This CDF defines a set of parameters for multiple spectrum analysis used by post-analysis event characterization processing in *DFX.*

Five parameters are defined in the `smult.par` files:

- *Smult-array* defines the array name for multiple spectrum analysis. For 3-C stations, use the station name as the array name (for example, *smult-array* = 'ABKT').
- *Smult-sta-list* defines the station name for multiple spectrum analysis. For arrays, all sensors of the array should be included (for example, *smult-sta-list* = "MJ00, MJ01, MJ02, MJ03, MJ04, MJ05, MJ06").
- *Smult-chan* defines the vertical channel type of the station.
- *Smult-min-frequency* and *smult-max-frequency* define the range of frequency band for multiple spectrum analysis.

The following baseline CDF is used for multiple spectrum analysis:

```
# @(#)   {sta}-smult.par     1.1     {mm/dd/yy}

# For smult
smult-array="{array}"
smult-sta-list="{ar01,ar02,....}"
smult-chan="sz"
smult-max-frequency=9.6875
smult-min-frequency=1.875
```

DFX - Event Characterization: {sta}-beam.par

Directory: `$config/app_config/DFX/beam/hydro`

This CDF specifies the filters for *DFX* as used by event characterizations. The following filters are used for stations with the Nyquist frequency of greater than 80 Hz. For other stations appropriate filters must be provided.

```
# CCASEID: @(#) DGS05-hydro.par CMR /main/testbed_7.0/1 01/10/2001
# FILE:
#    DGS05-hydro.par
#
# DESCRIPTION
#    Recipe file for specifying station specific hydro parameters
#

# Load in generic values.
par=$(dfx-par-dir) /hydro/hydro-rec.par

# get inverse response FIR filters applied to data if one exists
# in DFX-hydro-detection.scm
# par=$(dfx-par-dir) /precond/$(sta)-precond.par

#
# Any station-specific overrides to hydro-rec.par can go here.
#


# band pass filter frequencies used in DFX-hydro-detection.par
# By decree, the following definitions shall be used:
#             low frequency band = filt2
#          medium frequency band = filt5
#            high frequency band = filt7
#           broad frequency band = filt8
# any changes here need to be reflected in ../beam/hydro/STA-beam.par

#!BeginTable filter-recipe
|name    |type|rot |std|snr   |azi |slow   |flo   |fhi   |ford|zp|ftype|group  |

filt1    coh  no    1   1.0  0.0  0.000  2.00   4.00   3    0  BP   edchan
filt2    coh  no    1   1.0  0.0  0.000  3.00   6.00   3    0  BP   edchan
filt3    coh  no    1   1.0  0.0  0.000  4.00   8.00   3    0  BP   edchan
filt4    coh  no    1   1.0  0.0  0.000  6.00  12.00   3    0  BP   edchan
filt5    coh  no    1   1.0  0.0  0.000  8.00  16.00   3    0  BP   edchan
```

EVSC_DRV

Event Screening: evsc.par

Directory: `$config/app_config/automatic/EVSC`

This CDF defines a set of parameters for event screening. Three parameters in the `evsc.par` file may be updated as hydroacoustic stations are added or tuned. Sufficient data must be gathered to get a reliable estimate of noise statistics:

- *hydro_net_name* defines the hydroacoustic station name for event screening (for example, *hydro_net_name* = (`'PSUR'`, `'WK30'`, `'WK31'`).
- *hydro_noi7_ave* defines the long-term average of high-frequency noise.
- *hydro_noi7_sigma* defines the sigma of high-frequency noise.

To place *hydro_noi7_ave* and *hydro_noi7_sigma* values in the CDF, use a "*station name*:*value*" ASCII string, for example:

hydro_noi7_ave = `"PSUR:95.8615 WK30:97.5998 WK31:66.2562"`
hydro_noi7_sigma = `"PSUR:2.8713 WK30:1.1542 WK31:1.0735"`

For seismic stations, attenuation and region-specific correction information must be provided. The **attencoef** table in the database contains attenuation coefficients for each station. To add a new station, two new rows must be added for *sta* = station_name and *ratiotype* = (PnSn, PnLg), for a given *attenid* and *chan* = rms6-8. Generic coefficients can be used until a calibration is performed.

The new "attencoef" rows come in only two varieties: Stable (like WRA) or Tectonic (like ABKT). For a new station, determine Stable or Tectonic and copy the appropriate two rows, inserting the new station name. If it is difficult to determine Stable/Tectonic, use the nearest established station as a guide.

Attencoef examples:

Stable:

```
T/S:D3-17SN2.0/1.2 WRA pnlg rms6-8 1.57661 3.09126 -1.03457e-03  333.33 1888.87 01-MAY-01
T/S:D3-17SN2.0/1.2 WRA pnsn rms6-8 0.06457 0.64777 1.17185e-05   333.33 1888.87 01-MAY-01
```

Tectonic:

```
T/S:D3-17SN2.0/1.2 ABKT pnlg rms6-8 2.51605 3.92017 -1.58636e-03 333.33 1888.87 01-MAY-01
T/S:D3-17SN2.0/1.2 ABKT pnsn rms6-8 1.60570 2.52879 -9.27721e-04 333.33 1888.87 01-MAY-01
```

In addition, a correction file named `station_name.bayes.xyz` must be created and placed in the directory pointed to by the "*bayesdata_path*" parameter in the `evsc.par` file. This file can be of a generic form, representing zero correction and maximum uncertainty, until a calibration is performed.

```
# GENERIC.bayes. xyz
   0.00     0.00   -180.00   -90.00      90.00       90.000
-180.00   -90.00  0.000000   0.0625000   0.000000    0.0625000
 -90.00   -90.00  0.000000   0.0625000   0.000000    0.0625000
   0.00   -90.00  0.000000   0.0625000   0.000000    0.0625000
  90.00   -90.00  0.000000   0.0625000   0.000000    0.0625000
 180.00   -90.00  0.000000   0.0625000   0.000000    0.0625000
-180.00     0.00  0.000000   0.0625000   0.000000    0.0625000
 -90.00     0.00  0.000000   0.0625000   0.000000    0.0625000
   0.00     0.00  0.000000   0.0625000   0.000000    0.0625000
  90.00     0.00  0.000000   0.0625000   0.000000    0.0625000
 180.00     0.00  0.000000   0.0625000   0.000000    0.0625000
-180.00    90.00  0.000000   0.0625000   0.000000    0.0625000
 -90.00    90.00  0.000000   0.0625000   0.000000    0.0625000
   0.00    90.00  0.000000   0.0625000   0.000000    0.0625000
  90.00    90.00  0.000000   0.0625000   0.000000    0.0625000
 180.00    90.00  0.000000   0.0625000   0.000000    0.0625000
```

Chapter 6: Checklists for Configuring New Stations

This chapter identifies the parameters and configuration data files used to add a new station to the automatic and interactive processing systems and is organized as follows:

Chapter 6: Checklists for Configuring New Stations

STATIC PROCESSING PARAMETERS

This section presents the station-specific parameters that are static, such as station, channel names, and communication parameters, and that are defined at the time a new station is added to the automatic and interactive processing systems. These parameters do not have to be tuned and are modified only if the station configuration changes. Table 12 lists these static parameters alphabetically and provides the name of the corresponding CDF.

The parameters listed in Table 12 have a wider scope than the rest of this document. These parameters are self explanatory by their name, so they were not discussed in the previous chapters. Some parameters in the table are not defined in CDFs, but are defined in *Scheme* functions. To provide a complete checklist, they are also listed here.

TABLE 12: STATIC PROCESSING PARAMETERS

Parameter	Data Type[1] S	H	I	CDF	Location Directory
addresses	√	√	√	`MKloop.`*{sta}*`.par`	`app_config/continuous_data/Mkloop`
alpha_chans	√	√	√	`cds.par`	`system_specs`
alpha-station-list	√	√		`IDC.scm`	`app_config/interactive/ARS`
array_list	√		√	`XfkDisplay.par`	`app_config/interactive/XfkDisplay`
AUX_LIST	√ (auxiliary)			`shared.par`	`system_specs`

TABLE 12: STATIC PROCESSING PARAMETERS (CONTINUED)

Parameter	Data Type[1] S	H	I	CDF	Location Directory
chan	√	√	√	`global.priority`	`app_config/misc/SegArch`
datatype	√	√	√	`MKloop.`*{sta}*`.par`	`app_config/continuous_data/Mkloop`
dlid	√	√	√	`MKloop.`*{sta}*`.par`	`app_config/continuous_data/Mkloop`
exception station and channels	√	√	√	`stacap.par`	`app_config/misc/stacap`
hydro-chans		√		`ARSscan.par`	`app_config/interactive/ARSscan`
hydro_exclude_list		√		`ARSscan.par`	`app_config/interactive/ARSscan`
HYD_LIST		√		`shared.par`	`system_specs`
hydro-display -channels		√		`IDC.scm`	`app_config/interactive/ARS`
hydro-stations		√		`IDC.scm`	`app_config/interactive/ARS`
include_chans	√	√	√	`MKloop.`*{sta}*`.par`	`app_config/continuous_data/Mkloop`
INF_LIST			√	`shared.par`	`system_specs`
infra-chans			√	`ARSscan.par`	`app_config/interactive/ARSscan`
infra_exclude_list			√	`ARSscan.par`	`app_config/interactive/ARSscan`
instrument response	√	√	√	*{dfile}*	`station_specs/rsp`
magnitude-sub -stations-list	√			`IDC.scm`	`app_config/interactive/ARS`
nodo_wfproto	√	√	√	`MKloop.`*{sta}*`.par`	`app_config/continuous_data/Mkloop`
padtime	√	√	√	`MKloop.`*{sta}*`.par`	`app_config/continuous_data/Mkloop`
port	√	√	√	`MKloop.`*{sta}*`.par`	`app_config/continuous_data/Mkloop`
Preferred_Ports	√	√	√	`DLM`*{*}*`.par`	`host_config/DL1/par`

TABLE 12: STATIC PROCESSING PARAMETERS (CONTINUED)

Parameter	Data Type[1] S	H	I	CDF	Location Directory
priority	√	√	√	`global.priority`	`app_config/misc/SegArch`
PRI_LIST	√ (primary)			`shared.par`	`system_specs`
recipe_list	√		√	`XfkDisplay.par`	`app_config/interactive/XfkDisplay`
refsta	√	√	√	`global.priority`	`app_config/misc/SegArch`
role		√		`tin_{GRP}.par`	`app_config/distributed/tin`
samprate	√	√	√	`MKloop.`*{sta}*`.par`	`app_config/continuous_data/Mkloop`
set-hydro-max-samples-16min		√		`IDC.scm`	`app_config/interactive/ARS`
set-hydro-max-samples-default		√		`IDC.scm`	`app_config/interactive/ARS`
seismic_aux_chans	√			`ARSscan.par`	`app_config/interactive/ARSscan`
seismic_aux_exclude_list	√			`ARSscan.par`	`app_config/interactive/ARSscan`
seismic_pri_chans	√			`ARSscan.par`	`app_config/interactive/ARSscan`
seismic_pri_exclude_list	√			`ARSscan.par`	`app_config/interactive/ARSscan`
sta	√	√	√	`MKloop.`*{sta}*`.par`	`app_config/continuous_data/Mkloop`
sta	√	√	√	`global.priority`	`app_config/misc/SegArch`
{sta}-chans	√ (auxiliary)			`aux_sitechan.par`	`station_specs`
{sta}-chans	√	√	√	`tis.par`	`app_config/distributed/tis`
{sta}-chan-stream	√ (auxiliary)			`dispatch.par`	`app_config/messages/dispatch`

TABLE 12: STATIC PROCESSING PARAMETERS (CONTINUED)

Parameter	Data Type[1] S	H	I	CDF	Location Directory
{sta}-dlid	√	√	√	`cds.par`	`system_specs`
{sta}-GSEaddress	√ (auxiliary)			`dispatch.par`	`app_config/messages/dispatch`
{sta}-max -interval-size	√	√	√	`tis.par`	`app_config/distributed/tis`
{sta}-min -interval-size	√	√	√	`tis.par`	`app_config/distributed/tis`
{sta}-minchans	√	√	√	`tis.par`	`app_config/distributed/tis`
{sta}_par	√		√	`XfkDisplay.par`	`app_config/interactive/XfkDisplay`
{sta}_port	√	√	√	`cds.par`	`system_specs`
{sta}-prefchan	√	√	√	`ARSscan.par`	`app_config/interactive/ARSscan`
{sta}_recipe	√		√	`XfkDisplay.par`	`app_config/interactive/XfkDisplay`
{sta}_subdirectory	√	√	√	`cds.par`	`system_specs`
{sta}-target -interval-size	√	√	√	`tis.par`	`app_config/distributed/tis`
tin_interval_name		√		`tin_{GRP}.par`	`app_config/distributed/tin`
tin_timestamp_name		√		`tin_{GRP}.par`	`app_config/distributed/tin`
tin_per_interval		√		`tin_{GRP}.par`	`app_config/distributed/tin`
tin_goal_decay_minutes		√		`tin_{GRP}.par`	`app_config/distributed/tin`
tin_goal_decay_threshold		√		`tin_{GRP}.par`	`app_config/distributed/tin`

1. S = seismic, H = hydroacoustic, I = infrasonic

DYNAMIC PROCESSING PARAMETERS

This section lists the station-specific processing parameters that are adjustable (dynamic) and must be defined in the appropriate CDFs. Further tuning of these parameters may be necessary after a period of operation.

Current Baseline Parameter Values

Table 13 provides a checklist of the current baseline dynamic processing parameters, sorted alphabetically. The values in the baseline column indicate the current settings of the parameters for stations that have not been tuned. The combination of these data-specific dynamic processing parameters and the station-specific static parameters found in Table 12 provide a complete checklist of all parameters that must be configured to incorporate a new station into the operational IDC processing. Some CDFs include a set of parameters that do not have a specific name but have a fixed input format (for example, the CDF for beamforming). Those parameters are listed within a bracket in this table. The reference page listed in the right-most column indicates where to find a complete description of the CDF.

TABLE 13: DYNAMIC PROCESSING PARAMETERS

Parameter	Data Type S	H	I	Baseline	Location or ($config/)	CDF	Ref. Page
amp3c -chan-list	√			`BHZ`, `BHN`, `BHE` (or: `SHZ`, `SHN`, `SHE`; `bz`, `bn`, `be`; `sz`, `sn`, `se`)	`station_specs`	*{sta}*`.par`	10
amp3c-sta	√			*{sta}*	`station_specs`	*{sta}*`.par`	10
array_list	√	√		*{sta}*	`app_config`	`XfkDisplay.par`	47
azimuth -criterion			√	`25.0`	`app_config/DFX/infra`	*{sta}*`-infra.par`	24
BandType1	√	√	√	`b or s`	`station_specs`	*{sta}*`.par`	10
BandType3	√	√	√	`b or s`	`station_specs`	*{sta}*`.par`	10

TABLE 13: DYNAMIC PROCESSING PARAMETERS (CONTINUED)

Parameter	Data Type S	H	I	Baseline	Location or ($config/)	CDF	Ref. Page
band_width	√		√	`2.0`	`app_config/interactive/XfkDisplay/recipes`	*{sta}*`.par`	48
(beams for origin)	√ (array)			*{sta}*`-beam.par`	`app_config/DFX/beam/originbeam`	*{sta}*`-beam.par`	46
(beams for detection)	√	√	√	*{sta}*`-beam.par`	`app_config/DFX/beam/detection`	*{sta}*`-beam.par`	14
(beam group)	√	√	√	*{sta}*`-beam.par`	`app_config/DFX/beam`	*{sta}*`-beam.par`	12
(bin corrections)	√		√	`sasc.dummy`	`earth_specs/SASC`	`sasc.`*{sta}*	30
chan_list	√	√		`BHZ`, `BHN`, `BHE` for 3-C stations or `SHZ` for arrays (or `bz`, `bn`, `be` for 3-C stations, or `sz` for array)	`app_config/interactive/XfkDisplay/arrays`	*{sta}*`_fk.par`	48
coherent-integration-time			√	`32.0`	`app_config/DFX/infra`	*{sta}*`-infra.par`	24
coherent-threshold			√	`2.0`	`app_config/DFX/infra`	*{sta}*`-infra.par`	24
delk	√		√	`0.02`, `0.04`, `0.15`, `0.10` (3-C), or `0.158` for S `0.124` for I	`app_config/interactive/XfkDisplay/arrays`	*{sta}*`_fk.par`	48
dels	√		√	`0.0` for S `0.102` for I	`app_config/interactive/XfkDisplay/arrays`	*{sta}*`_fk.par`	48
fhi	√		√	`4.0` for S `2.0` for I	`app_config/interactive/XfkDisplay/recipes`	*{sta}*`.par`	48

TABLE 13: DYNAMIC PROCESSING PARAMETERS (CONTINUED)

Parameter	Data Type S	H	I	Baseline	Location or ($config/)	CDF	Ref. Page
fk-chan	√			bd, BDF, ez, md, sd, sz, SHZ, shz, bhz, BHZ, ehz, EHZ	app_config/ DFX/fk	*{sta}*-fk.par	26
fk-dk	√			0.02, 0.04, 0.15, or 0.158	app_config/ DFX/fk	*{sta}*-fk.par	26
fk-ds	√			0.0	app_config/ DFX/fk	*{sta}*-fk.par	26
fk-fhi	√			8.0 or 1.0	app_config/ DFX/fk	*{sta}*-fk.par	26
fk-filter -onset	√			6.0 or 75.0	app_config/ DFX/fk	*{sta}*-fk.par	26
fk-flo	√			0.75 or 0.06	app_config/ DFX/fk	*{sta}*-fk.par	26
fk-forder	√			3.0 or 8.0	app_config/ DFX/fk	*{sta}*-fk.par	26
fk-fzp	√			0.0	app_config/ DFX/fk	*{sta}*-fk.par	26
fk-lag	√			2.5, 3.5, 6.0, or 32.0	app_config/ DFX/fk	*{sta}*-fk.par	26
fk-lead	√			1.0, 2.0, 4.0, or 32.0	app_config/ DFX/fk	*{sta}*-fk.par	26
fk-max -slow	√			0.36 or 5.0	app_config/ DFX/fk	*{sta}*-fk.par	26
fk-nslow	√			55.0, 65.0, 85.0, or 101	app_config/ DFX/fk	*{sta}*-fk.par	26
fkhif	√		√	–1.0 for S 2.0 for I	app_config/ interactive/ XfkDisplay/ recipes	*{sta}*.par	48
fklof	√		√	–1.0 for S 0.12 for I	app_config/ interactive/ XfkDisplay/ recipes	*{sta}*.par	48

TABLE 13: DYNAMIC PROCESSING PARAMETERS (CONTINUED)

Parameter	Data Type S	H	I	Baseline	Location or ($config/)	CDF	Ref. Page
fktype	√		√	*{sta}*	app_config/ interactive/ XfkDisplay/ arrays	*{sta}*_fk.par, *{sta}*.par	48
flo	√		√	1.0 for S 0.12 for I	app_config/ interactive/ XfkDisplay/ recipes	*{sta}*.par	48
forder	√		√	3.0 for S 8.0 for I	app_config/ interactive/ XfkDisplay/ recipes	*{sta}*.par	48
fzp	√		√	0.0	app_config/ interactive/ XfkDisplay/ recipes	*{sta}*.par	48
gap-time			√	16.0	app_config/ DFX/infra	*{sta}*-infra.par	24
grids of unblocked regions		√		optional	earth_specs/ BLK_OSO	BLK.*{sta}*.T	40
lag	√		√	4.0 for S 16.0 for I	app_config/ interactive/ XfkDisplay/ recipes	*{sta}*.par	48
lead	√		√	1.5 for S 16.0 for I	app_config/ interactive/ XfkDisplay/ recipes	*{sta}*.par	48
lta-time			√	72.0	app_config/ DFX/infra	*{sta}*-infra.par	24
max_inc	√		√	89.0	app_config/ interactive/ XfkDisplay/ recipes	*{sta}*.par	48

TABLE 13: DYNAMIC PROCESSING PARAMETERS (CONTINUED)

Parameter	Data Type S	H	I	Baseline	Location or ($config/)	CDF	Ref. Page
max_slow	√		√	`0.36` for S `5.0` for I	`app_config/interactive/XfkDisplay/recipes`	*{sta}*`.par`	48
min-teleseismic-velocity	√			`9.4`	`station_specs`	*{sta}*`.par`	10
min_sta	√	√	√	`1` for 3-C	`app_config/interactive/XfkDisplay/recipes`	*{sta}*`.par`	48
NetType	√	√	√	`ss` or `array`	`station_specs`	*{sta}*`.par`	10
(neural weights)	√			optional	`earth_specs/STAPRO`	`hydro_`*{sta}*`.weights`	29
(neural weights)	√			`default.nn`	`earth_specs/STAPRO/ipnnwts.dir`	*{sta}*`.nn`	29
nois-fkqual-fstat	√			optional	`station_specs`	*{sta}*`.par`	10
nslow	√		√	`55.0`, `65.0`, `85.0` for S `101` for I	`app_config/interactive/XfkDisplay/recipes`	*{sta}*`.par`	48
polar-alpha	√			`0.3`	`app_config/DFX/polar`	*{sta}*`-polar.par`	25
polar-chan-list	√			`be`, `bn`, `bz`; or `se`, `sn`, `sz`; or `ee`,`en`,`ez`;or `bhe`, `bhn`, `bhz`; or `BHE`, `BHN`, `BHZ`; or `she`, `shn`, `shz`; or `SHE`, `SHN`, `SHZ`; or `ehe`, `ehn`, `ehz`; or `EHE`, `EHN`, `EHZ`	`app_config/DFX/polar`	*{sta}*`-polar.par`	25
polar-dk	√			`0.10`	`app_config/DFX/polar`	*{sta}*`-polar.par`	25
polar-ds	√			`0.0`	`app_config/DFX/polar`	*{sta}*`-polar.par`	25

TABLE 13: DYNAMIC PROCESSING PARAMETERS (CONTINUED)

Parameter	Data Type S	H	I	Baseline	Location or ($config/)	CDF	Ref. Page
polar-fhi	√			`4.0`	`app_config/ DFX/polar`	*{sta}*`-polar.par`	25
polar-fonset	√			`5.0`	`app_config/ DFX/polar`	*{sta}*`-polar.par`	25
polar-noise -lead	√			`30.0`	`app_config/ DFX/polar`	*{sta}*`-polar.par`	25
polar-noise -len	√			`9.5`	`app_config/ DFX/polar`	*{sta}*`-polar.par`	25
polar -overlap -fraction	√			`0.333`	`app_config/ DFX/polar`	*{sta}*`-polar.par`	25
polar -signal-lead	√			`1.5`	`app_config/ DFX/polar`	*{sta}*`-polar.par`	25
polar -signal-len	√			`5.5`	`app_config/ DFX/polar`	*{sta}*`-polar.par`	25
polar-sta -list	√			*{sta}*	`app_config/ DFX/polar`	*{sta}*`-polar.par`	25
polar -window	√			`1.5`	`app_config/ DFX/polar`	*{sta}*`-polar.par`	25
power_ output	√		√	`0.0`	`app_config/ interactive/ XfkDisplay/ recipes`	*{sta}*`.par`	48
qc-apply -extended			√		`app_config/ DFX/qc`	*{sta}*`-infra -qc.par`	11
qc-fix			√	`0.0`	`app_config/ DFX/qc`	*{sta}*`-infra -qc.par`	11
qc-interval -overlap -fraction			√	`0.5`	`app_config/ DFX/qc`	*{sta}*`-infra -qc.par`	11
qc-interval -samples			√	`640.0`	`app_config/ DFX/qc`	*{sta}*`-infra -qc.par`	11

TABLE 13: DYNAMIC PROCESSING PARAMETERS (CONTINUED)

Parameter	Data Type S	H	I	Baseline	Location or ($config/)	CDF	Ref. Page
qc-max -mask -fraction			√	0.2	app_config/ DFX/qc	*{sta}*-infra -qc.par	11
recipe_list	√		√	*{sta}*	app_config/ interactive/ XfkDisplay	XfkDisplay. par	47
site_db	√		√	$(database)	app_config/ interactive/ XfkDisplay/ arrays	*{sta}*_fk.par	48
site_list	√		√	*{sta}*	app_config/ interactive/ XfkDisplay/ arrays	*{sta}*_fk.par	48
slowness-bins-to -refine			√	5.0	app_config/ DFX/infra	*{sta}*-infra.par	24
slowness -criterion			√	0.5	app_config/ DFX/infra	*{sta}*-infra.par	24
slowness-width-for -peak -interpolate			√	0.5	app_config/ DFX/infra	*{sta}*-infra.par	24
smult-array	√			*{sta}*	app_config/ DFX/smult	*{sta}*-smult.par	53
smult-chan	√			sz, shz, SHZ, bz, bhz, BHZ, ez, ehz, or EHZ	app_config/ DFX/smult	*{sta}*-smult.par	53
smult-max -frequency	√			9.6875	app_config/ DFX/smult	*{sta}*-smult.par	53
smult-min -frequency	√			1.875	app_config/ DFX/smult	*{sta}*-smult.par	53
smult-sta -list	√			*{sta}*	app_config/ DFX/smult	*{sta}*-smult.par	53

TABLE 13: DYNAMIC PROCESSING PARAMETERS (CONTINUED)

Parameter	Data Type S	H	I	Baseline	Location or ($config/)	CDF	Ref. Page
sta	√		√	*{sta}*	app_config/ interactive XfkDisplay/ arrays	*{sta}*_fk.par	48
{sta}-components	√ (auxiliary)			optional	app_config/ automatic/ WaveExpert	WaveExpert. par	40
sta-lta -threshold			√	1.95	app_config/ DFX/infra	*{sta}*-infra.par	24
{sta} -prob_snr_ threshold	√ (auxiliary)			optional	app_config/ automatic/ WaveExpert	WaveExpert. par	40
StaPro-do -loc-mag		√	√	0 (FALSE) for non-seismic	station_specs	*{sta}*.par	10
StaPro -statype		√	√	"hy" for hydroacoustic, "infra" for infrasonic	station_specs	*{sta}*.par	10
sta-time			√	8.0	app_config/ DFX/infra	*{sta}*-infra.par	24
(station -specific tlsf model)	√			optional	earth_specs/ MAG/tlsf	idc_tlsf.defs	31
StaType	√	√	√	3C or 1C	station_specs	*{sta}*.par	10
tf_3c-chans	√	√	√	be, bn, bz; or bhe, bhn, bhz; or BHE, BHN, BHZ	station_specs	*{sta}*.par	10
tf_vert-chan	√	√	√	bz, bhz, BHZ, sz, shz or SHZ	station_specs	*{sta}*.par	10
three_comp	√		√	1.0 (3-C)	app_config/ interactive/ XfkDisplay/ recipes	*{sta}*.par	48
update -time-of -processing			√	16.0	app_config/ DFX/infra	*{sta}*-infra.par	24

TABLE 13: DYNAMIC PROCESSING PARAMETERS (CONTINUED)

Parameter	Data Type S	H	I	Baseline	Location or ($config/)	CDF	Ref. Page
vel0	√			5.5	app_config/ interactive/ XfkDisplay/ recipes	*{sta}*.par	48
WaveType		√	√	'hydro-' or 'infra-'	station_specs	*{sta}*.par	10
xfk-dk			√	0.124	app_config/ DFX/infra	*{sta}*-infra.par	11
xfk-ds			√	0.102	app_config/ DFX/infra	*{sta}*-infra.par	11

CDFs NEEDED TO ADD NEW STATIONS

Table 14 sorts, by processing application software, the CDFs needed to add data from new stations to the automatic and interactive processing systems. The reference page listed in the right-most column indicates where to find a complete description of the CDF.

TABLE 14: CHECKLIST OF CDFs NEEDED TO ADD NEW STATIONS TO PROCESSING SYSTEMS

Function/ Application	CDF	Description	Data Type[1]	Ref. Page
Station Processing				
DFX	*{sta}*.par	general station parameters	SHI	10
	{sta}-infra-qc.par	data quality control processing	I	11
	{sta}-beam.par	channel groups for beamforming or cross-correlation	SHI	12
	{sta}-beam.par	steering beams for signal detection	SHI	14
	{sta}-hydro.par	parameters for hydroacoustic data processing	H	25

TABLE 14: CHECKLIST OF CDFS NEEDED TO ADD NEW STATIONS TO PROCESSING SYSTEMS (CONTINUED)

Function/ Application	CDF	Description	Data Type[1]	Ref. Page
DFX	*{sta}*-infra.par	parameters for infrasonic data processing	I	24
	{sta}-polar.par	parameters for 3-C polarization analysis	S	25
	{sta}-fk.par	parameters for automated F-k analysis	S	26
	{sta}-precond.par	FIR filter	H	23
	{sta}-infra-amp.par	nature of amplitude estimation	I	28
StaPro	bayes.tbl	Bayesian probabilities	S	30
	ipnnwts.tbl	neural network weights of all 3-C seismic stations	S	28
	{sta}.nn	station-specific neural network weights for each 3-C seismic station	S	29
	hydro_*{sta}*.weights	set of neural network weights for phase identification	H	29
	sasc.*{sta}*	tables for Slowness-Azimuth Station Correction (SASC)	SI	30
	ims.defs	velocity model	S	32
	idc_mdf.defs	magnitude definitions	S	32
Network Processing				
GAcons	GAcons.par	build GA grid files	SHI	39
GAassoc, GAconflict	sasc.*{sta}*	tables for Slowness-Azimuth Station Correction (SASC)	SI	40
	idc_tlsf.defs	magnitude estimation	S	40
	BLK.*{sta}*.T	station-specific blockage grids for hydroacoustic stations	H	40
WaveExpert	WaveExpert.par	station-specific parameters for waveform request of the auxiliary seismic stations	S	40

TABLE 14: CHECKLIST OF CDFS NEEDED TO ADD NEW STATIONS TO PROCESSING SYSTEMS (CONTINUED)

Function/ Application	CDF	Description	Data Type[1]	Ref. Page
HAE	`hae-net`*{GRP}*`.par`	network-specific parameters for HAE calculation	H	33
	`tin_`*{GRP}*`.par`	site-specific parameters for creating HAE time intervals	H	35
Interactive Processing				
DFX	*{sta}*`.par`	general station parameters needed for processing	SHI	45
	{sta}`-beam.par`	channel groups for beamforming or cross-correlation	SHI	46
DFX, ARS	*{sta}*`-beam.par`	standard beams steered to origin location for automated system	SI	46
DFX	*{sta}*`-infra.par`	parameters for infrasonic data processing	I	47
	{sta}`-polar.par`	parameters for 3-C polarization analysis	S	47
	{sta}`-fk.par`	array definition parameters for automated frequency-wavenumber (F-k) analysis	SI	47
XfkDisplay	*{sta}*`.par`	dynamic processing parameters	SI	48
ARS	`sasc.`*{sta}*	tables for Slowness-Azimuth Station Correction (SASC)	SI	50
	`BLK.`*{sta}*`.T`	station-specific blockage grid for hydroacoustic stations	H	50
Post-analysis Processing				
EvLoc	`idc_tlsf.defs`	all regionalized transmission loss (TL)	S	53
DFX	*{sta}*`-smult.par`	set of parameters for multiple spectrum analysis	S	53
	{sta}`-beam.par`	filters for *DFX* as used by event characterization	H	55
evsc_drv	`evsc.par`	set of parameters for event screening calculations	SHI	56

1. S = seismic, H = hydroacoustic, I = infrasonic

CDFS NEEDED TO ADD OR MODIFY CHANNEL NAMES

Table 15 sorts, by processing application software, the CDFs that contain references to channel names. For most of the listed CDFs, channel names are application-specific rather than station-specific and as such, they may not need any modification during station installation. This list may be used as a guide to CDFs to review when a station with a new channel name is introduced into the system or when an existing station changes its channel names.

TABLE 15: CDFS CONTAINING CHANNEL NAME REFERENCES

Application	Location or ($config/)	CDF	Parameter	Description
ARS	`app_config/interactive/ARS`	`IDC.scm`	(many)	See the `ARS.scm` file for all the channels defined.
ARSscan	`app_config/interactive/ARSscan`	`ARSscan.par`	`seismic-pri-chans=`<*chanlist*>	Seismic primary station channels to scan for waveform data. Defined as the available vertical and beam channels for the stations. `seismic-pri-chans="'bz','bhz','BHZ',…"`
			`seismic-aux-chans=`<*chanlist*>	Seismic auxiliary station channels to scan for waveform data. Defined as the available vertical and beam channels for the stations. `seismic-aux-chans="'bz','BHZ','bhz',…"`
			`hydro-chans=`<*chanlist*>	Hydroacoustic station channels to scan for waveform data. Defined as the available vertical, for the T-phase stations, and beam channels for the hydroacoustic stations. `hydrochans="'cb','ed','ez'"`

TABLE 15: CDFS CONTAINING CHANNEL NAME REFERENCES (CONTINUED)

Application	Location or ($config/)	CDF	Parameter	Description
ARSscan *(continued)*	app_config/ interactive/ ARSscan	ARSscan.par	infra-chans= *<chanlist>*	Infrasonic station channels to scan for waveform data. Defined as the available infrasound and beam channels for the infrasonic arrays. infra-chans= "'cb','mx',…"
			seismic-pri-pref -chan-default= *<chan>* seismic-aux-pref -chan-default= *<chan>* hydro-pref-chan -default=*<chan>* infra-pref-chan -default=*<chan>*	*-pref-chan-default specifies the global default channel to display. seismic-pri-pref -chan-default="sz" seismic-aux-pref -chan-default="sz" hydro-pref-chan -default="ed" infra-pref-chan -default="sd"
			{sta}-prefchan= *<station/chan*...>	*{sta}*-prefchan specifies the preferred channels for display by station. This overrides the global default channel specified above. YKA-prefchan="YKR8/sz YKW2/bz YKA/cb YKA/ fkb"
DFX	station_ specs	{sta}.par	amp3-chan-list= *<chanlist>*	A list of orthogonal components to use for the input station. amp3c-chan-list= "'bhz','bhe','bhn'"
DFX-beam	app_config/ DFX/beam	*{sta}*-beam.par	(beams)	See pages 12–22.

TABLE 15: CDFS CONTAINING CHANNEL NAME REFERENCES (CONTINUED)

Application	Location or ($config/)	CDF	Parameter	Description
DFX-Evch	`station _specs`	*{sta}*`.par`	`tf-vert-chan=` <*chan*>	`tf-vert-chan` provides the channel to use for vertical-component stations. The channel used to be derived from the parameter tf-bandtype1, which would create a channel name by appending `"z"` to the parameter value. This new parameter allows the user to explicitly set the channel name in its entirety. `par:tf-vert-chan=bhz`
			`tf-3c-chans=` <*chanlist*>	`tf-3c-chans` provides the channels to use for three-component stations. The channels used to be derived from the parameter tf-bandtype3, which would create a channel name by appending `z`, `n`, and `e` to the parameter value. This new parameter allows the user to explicitly set the channel name in its entirety. The channel order must be vertical, north, and east channels. `tf-3c-chans= bhz,bhn,bhe`
	`app_config/ DFX/smult`	*{sta}*`-smult.par`	`smult-chan=` <*chan*>	Defines the vertical channel type of the station. `smult-chan="BHZ"`
DFX-fk	`app_config/ DFX/fk`	*{sta}*`-fk.par`	`fk-chan=`<*chan*>	Components to use for the input channel. `fk-chan=BDF`
DFX-polar	`app_config/ DFX/polar`	*{sta}*`-polar.par`	`polar-chan-list=` <*chanlist*>	List of orthogonal components to use for polarization analysis of a 3-C input station. `polar-chan-list= SHE,SHN,SHZ`

TABLE 15: CDFS CONTAINING CHANNEL NAME REFERENCES (CONTINUED)

Application	Location or ($config/)	CDF	Parameter	Description
DFX-splp	app_config/ DFX/splp	splp.par	splp-chan-list= *<chanlist>*	Components to use for the input channels. splp-chan-list= bz,bn,be,BHZ,BHN,BHE
dispatch	app_config/ messages/ dispatch	dispatch.par	*{sta}{chan}*-stream= *<chan>*	Channel code to be inserted into the outgoing request message. This provides a mechanism to map channel codes as they are stored in the database to more universally accepted codes required by the GSE2.0 or IMS1.0 format, if these are different. Optional. The default is the $(chan) argument, with any '%' wildcard characters being translated to '*'. ALQ-BHE-stream=BHE
doday	app_config/ misc/ SegArch	doday.par	infra_chan_ expression= *<expression>*	Expression to use when selecting channels for the infrasonic window when *seg* is segarch. infra_chan_expression = "chan in ('az','md','mx','sd', 'sl')"
FrameStore	app_config/ continuous_ data/ FrameStore	fstore_ idc.par	Channels[*id*]= *<channels>*	Each frame set requires a channel list. Channels are defined by the par strings in the form: Channels[id]= "channels" where the *id* matches a value in the FRAMESET table "id" column (see the *FrameStore* man page). Channels[10]= "ABC/sz ABC/se ABC/ sn"

TABLE 15: CDFS CONTAINING CHANNEL NAME REFERENCES (CONTINUED)

Application	Location or ($config/)	CDF	Parameter	Description
GA	`app_config/automatic/GA`	`GA.par`	`channels=`<*chanlist*>	Information used to read the information in the **siteaux** table through a joint site/siteaux query. The value should be a list of channel names. The order of names in the list is a preference order. If **siteaux** record for a station is present for channel "cb", that record is used. If there is no information for that channel, channel "bz" is used, and so on. `channels="cb,bz,BHZ,bhz,sz,SHZ,shz,ed,ez,EHZ,ehz,is"`
GAcons	`app_config/automatic/GAcons`	`GAcons.par`	`channels=`<*chanlist*>	Information used to read the information in the **siteaux** table through a joint site/siteaux query. The value should be a list of channel names. The order of names in the list is a preference order. If **siteaux** record for a station is present for channel "cb", that record is used. If there is no information for that channel, channel "bz" is used, and so on. `channels="cb,bz,BHZ,bhz,sz,SHZ,shz,ed,ez,EHZ,ehz,is"`
HAE	`app_config/automatic/HAE`	`hae.par`	`chan-list=`<*chanlist*>	List of channels to process, separated by quoted commas ‘,’. `chan-list=sp’,’ed`

TABLE 15: CDFS CONTAINING CHANNEL NAME REFERENCES (CONTINUED)

Application	Location or ($config/)	CDF	Parameter	Description
Mkloop	`app_config/continuous_data/Mkloop`	`Mkloop.`*{sta}*`.par`	`include_chans=`*<chanlist>*	List of channel names that are to be used in this run of *Mkloop*. Supersedes `exclude_chans`. `include_chans=BDF`
	`app_config/continuous_data/Mkloop`	`Mkloop.`*{sta}*`.par`	`exclude_chans=`*<chanlist>*	List of channel names that are not to be used in this run of *Mkloop*. Superseded by `include_chans`. `exclude_chans=LDA,LWS,LWD,LKO`
QTrace	`app_config/automatic/QTrace.par`	`QTrace.par`	`wf_channels=`*<chanlist>*	List of channels to plot in order of precedence. The first in the list has the highest precedence. `wf_channels="cb,ib,sz,SHZ,shz,bz,BHZ,bhz"`
RequestFlow	`app_config/distributed/WorkFlow`	`Request-Flow.par`	`workflow-query=`*<query>*	Channel- and station-based query to extract information about auxiliary station requests from the **request** table. The result of the query has the format of the **interval** table and may used by *WorkFlow* to display the status of the auxiliary station requests. `workflow-query="select… where chan in ('bhz','shz','lhz'…)"`
SegArch	`app_config/misc/SegArch`	`global.priority`	`channel`	Channel identifier. A data source is uniquely identified by channel, sta, jdate, and time.

TABLE 15: CDFS CONTAINING CHANNEL NAME REFERENCES (CONTINUED)

Application	Location or ($config/)	CDF	Parameter	Description

stacap	`app_config/ misc/stacap`	`stacap.par`	`capability_ exception_ chanlist_` *<id>*=*<chanlist>*	Channels that should not be considered for a given station identified by *<id>*. There should be a corresponding `selection_exception_sta_`*<id>* defined in this CDF that defines the station to which this exclusion applies.
				`capability_ exception_sta_5= "PPT"`
				`capability_exception_ chanlist_5= "SHZ,SHN,SHE"`

SynGen	`app_config/ misc/SynGen`	`SynGen.par`	`channels=` *<chanlist>*	List of all unique channels from seismic, hydroacoustic, and infrasonic. `channels= "cb,ed,bz,BHZ,bhz, sz,SHZ,shz,ez,EHZ, ehz,is"`

tiseg_server	`station_ specs`	`aux_ sitechan.par`	*{sta}*`-chans=` *<station/chan* `...`>	*tiseg* relies on this CDF for stachan information. This CDF contains a parameter similar to the following for each auxiliary station:
				`{sta}-chans= "station/chan ..."`
				The first stachan defines the monitor channel.
				`FITZ-chans= "FITZ/bhe FITZ/bhn FITZ/bhz"`

tis_server	`app_config/ distributed`	`dacs.par`	`alpha-chans=` *<chanlist>*	Defaults channels for the time-interval processes *tis_server*. `alpha-chans= "'sz','sn','se', 'SHZ','SHN',…"`

TABLE 15: CDFS CONTAINING CHANNEL NAME REFERENCES (CONTINUED)

Application	Location or ($config/)	CDF	Parameter	Description
tis_server-tis	`app_config/distributed/tis`	`tis.par`	`default-chans=` <*chanlist*>	*chanlist* must list the superset of all channels across all stations to be monitored by *tis_server*. Any channels that are to be excluded from the interval creation coverage algorithm can be left out of the *chanlist*. However, the excluded channels apply in general and are not station specific. See `sta-chans` for station site channel specification. The *chanlist* is supplied as a sequence of names separated by delimeters (commas, spaces, colons, and so on). The actual delimeters used are specified by DELIMETERS. `default-chans="sz sn se bn be bz, etc"`
	`app_config/distributed/tis`	`tis.par`	`{`*sta*`}-chans=` <*chanlist*>	*chanlist* specifies all channels for station *sta* to be monitored by *tis*. Listed channels are included in the interval creation coverage algorithm, channels excluded from *chanlist* are not considered in the interval coverage algorithm. *sta* is one of the network stations. The *chanlist* is supplied as a sequence of names separated by delimeters (commas, spaces, colons, and so on). The actual delimeters used are specified by DELIMETERS. `YKA-chans="sz bz bn be"`

TABLE 15: CDFS CONTAINING CHANNEL NAME REFERENCES (CONTINUED)

Application	Location or ($config/)	CDF	Parameter	Description
WaveExpert	`app_config/ automatic/ WaveExpert`	`WaveEx- pert.par`	`components=` <*chanlist*>	List of station components for which to write requests. Station components must have an entry in the **sitechan** table for a request to be generated. `components= "SHZ,SHN,SHE,shz, shn,…"`
WaveExpert	`app_config/ automatic/ WaveExpert`	`WaveExpert -lp.par`	`components=` <*chanlist*>	List of station components for which to write requests. Station components must have an entry in the **sitechan** table for a request to be generated. `components= "lhe,lhn,lhz,LHE,LHN, LHZ"`
XfkDisplay	`app_config/ interactive/ XfkDisplay /arrays`	*{sta}*`_fk. par`	`chan_list=` <*chanlist*>	Data channels to use from the **wfdisc** table. The most commonly used channel for FK processing is SHZ. If the *three_comp* is set you must specify the three components you wish to use. `chan_list= "bhz,bhn,bhe"`

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Glossary

A

architecture

Organizational structure of a system or component.

array

Collection of sensors distributed over a finite area (usually in a cross or concentric pattern) and referred to as a single station.

arrival

Signal that has been associated to an event. First, the Global Association (GA) software associates the signal to an event. Later during interactive processing, many arrivals are confirmed and improved by visual inspection.

ARS

Analyst Review Station. This application provides tools for a human analyst to refine and improve the event bulletin by interactive analysis.

ASCII

American Standard Code for Information Interchange. Standard, unformatted 256-character set of letters and numbers.

associate

Assign an arrival to an event.

attribute

(1) Characteristic of an item; specifically, a quantitative measure of a S/H/I arrival such as azimuth, slowness, period, and amplitude. (2) A database column.

AUX

(1) R: Auxiliary Power Supply. (2) S/H/I: Abbreviation for an auxiliary station code.

azimuth

Direction, in degrees, from a station to an event or seismic signal.

B

beam

Waveform created from array station elements that are sequentially summed in the direction of a specified azimuth and slowness.

build

(1) To create an event by detecting its seismic or hydroacoustic signals, associating its arrivals, identifying them as phases, and locating the event. (2) An operational version of a system or component that incorporates a specified subset of the capabilities that the final product will provide.

C

chan.

Channel.

channel

(1) R: Energy window (in keV) representing a differential increment of pulse height. Many spectra are divided into 4,096 channels. (2) S/H/I: Component of motion or distinct stream of data.

coherent

Having a fixed phase relationship; as signals from a wavefront detected on numerous seismic or infrasonic array station elements.

coherent beam

Summation of data from numerous seismic or infrasonic array station elements after shifting the data traces in time to maximize the coherence of plane-wave signals travelling along a particular azimuth and slowness.

command

Expression that can be input to a computer system to initiate an action or affect the execution of a computer program.

component

(1) One dimension of a three-dimensional signal; (2) The vertically or horizontally oriented (north or east) sensor of a station used to measure the dimension; (3) One of the parts of a system; also referred to as a module or unit.

Computer Software Component

Functionally or logically distinct part of a computer software configuration item, typically an aggregate of two or more software units.

Computer Software Configuration Item

Aggregation of software that is designated for configuration management and treated as a single entity in the configuration management process.

configuration

Arrangement of computer system or component as defined by the number, nature, and interconnection of its parts.

control flow

Sequence in which operations are performed during the execution of a computer program.

CSCI

Computer Software Configuration Item.

D

data flow

Sequence in which data are transferred, used, and transformed during the execution of a computer program.

data type

Kind of data in a data message.

defining

Arrival attribute, such as arrival time, azimuth, or slowness, which is used in calculating the event's location or magnitude.

detection

Probable signal that has been automatically detected by the Detection and Feature Extraction (DFX) software.

DFX

Detection and Feature Extraction.

E

Element

Single station or substation of an array, referred to by its element name (such as YKR8), as opposed to its array name (YKA in this example).

event

(1) S/H/I: Unique source of seismic, hydroacoustic, or infrasonic wave energy that is limited in both time and space. (2) R: occurrence that displays characteristics indicative of a possible nuclear weapons test.

execute

Carry out an instruction, process, or computer program.

F

filesystem

Named structure containing files in subdirectories. For example, UNIX can support many filesystems; each has a unique name and can be attached (or mounted) anywhere in the existing file structure.

F-k

Frequency versus wavenumber (k) analysis that maps phase power from an array as a function of azimuth and slowness.

G

GA

Global Association application. GA associates S/H/I phases to events.

H

hb

Horizontal beam.

hydroacoustic

Pertaining to sound in the ocean.

I

IDC

International Data Centre.

IMS

International Monitoring System.

infrasonic

Pertaining to low-frequency (sub-audible) sound in the atmosphere.

J

Julian date

Increasing count of the number of days since an arbitrary starting date.

K

km

Kilometer.

M

MB

Megabyte. 1,024 kilobytes.

ML

Magnitude based on waves measured near the source.

N

noise

Incoherent natural or artificial perturbations of the waveform trace caused by ice, animals migrations, cultural activity, equipment malfunctions or interruption of satellite communication, or ambient background movements.

O

offline

Not connected to a network or computer.

onset

First appearance of a seismic or acoustic signal on a waveform.

origin

Hypothesized time and location of a seismic, hydroacoustic, or infrasonic event. Any event may have many origins. Characteristics such as magnitudes and error estimates may be associated with an origin.

P

parameter

Quantitative attribute of a seismic arrival, such as azimuth, slowness, period, and amplitude.

parameter file

ASCII file containing values for parameters of a program. Par files are used to replace command line arguments. The files is formatted as a list of `[token = value]` strings.

period

Average duration of one cycle of a phase, in seconds per cycle.

phase

Arrival that is identified based on its path through the earth.

PIDC

Prototype International Data Centre.

pipeline

Flow of data at the IDC from the receipt of communications to the final automated processed data before analyst review.

polarization

Form of three-component analysis used to derive azimuth and slowness information from non-array stations.

Q

QC

Quality Control.

S

s

Second (time).

sample

(1) Any physical entity counted on a detector. (2) Solid or gaseous entity collected by a blower at an RMS station that is analyzed for its radioactive contents.

SASC

Slowness-Azimuth Station Corrections.

Scheme

Language by which ARS and other tools are configured.

SEL3

Standard Event List 3.

S/H/I

Seismic, hydroacoustic, and infrasonic.

slowness

Inverse of velocity, in seconds/degree; a large slowness has a low velocity.

snr

Signal-to-noise ratio.

software unit

Discrete set of software statements that implements a function; usually a subcomponent of a CSC.

spectrum

(1) R: a plot of the differential number of pulses (in counts) per differential pulse height (in channels or keV). (2) S/H/I: a plot of the energy contained in waveforms as a function of frequency.

sta

Station.

StaPro

Station Processing application for S/H/I data.

station

Site where a monitoring instrument is installed. Stations can either be single sites (for example, BGCA) or arrays (for example, ASAR).

T

theoretical

Point where an arrival is expected to appear on a waveform, based on an event's location and depth.

TL

Transmission loss.

TLSF

Transmission loss specification file.

TM

Threshold monitoring.

U

UNIX

Trade name of the operating system used by the Sun workstations.

V

version

Initial release or re-release of a computer software component.

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